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Vol 52, No 7

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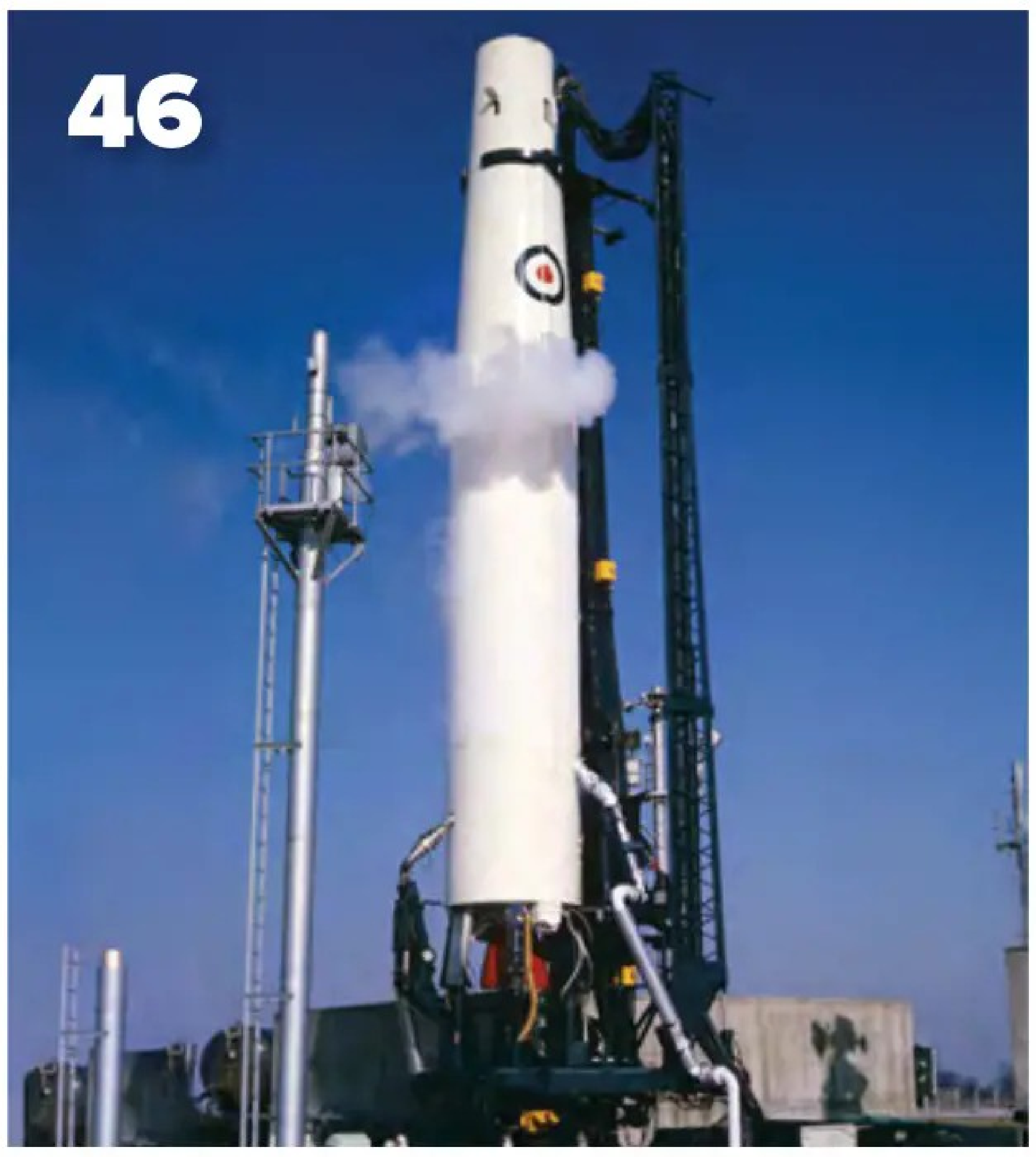

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COVER IMAGE: A US Air Force Lockheed SR-71A of the 9th Strategic Reconnaissance Wing at Beale AFB, California. LOCKHEED MARTIN

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From the Editor

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Do we pay enough attention to our Cold War heritage? The thought crossed my mind this month, chatting to Denis Calvert about his splendid article on the RAF's Thor missiles. Look at the list of Thor bases and some stand out, but not for their role as part of our post-war strategic defences. Rather, they are still far better-known as wartime bomber stations — the likes of Mepal, Bardney, Ludford Magna, Harrington and Polebrook, for example, are recalled primarily for that part of their history. Now, one can hardly expect the association of these locations with a missile that spent only a short time on the RAF's inventory to have anything like the renown of their days as active Second World War airfields. But their Cold War roles do seem almost unfairly forgotten by comparison.

> ***"Politically, socially, militarily, culturally, the Cold War offers very rich pickings"***

It's exactly that omission that we try to put right in our Cold War special issue every year, not least since new stories of the period keep on emerging. And many efforts to remember that tense time, and the impact it had on Britain, are under way. I was delighted to see the new heritage centre at the former RAF Sculthorpe opening to such acclaim at the start of May; we'll touch further on that in a future issue. Politically, socially, militarily, culturally, the Cold War offers very rich pickings for anyone with an historical interest.

The tragic death of Battle of Britain Memorial Flight pilot Sqn Ldr Mark Long, when Spitfire MK356 crashed close to RAF Coningsby on 25 May, was deeply felt across the whole of the historic aircraft community and beyond. The many expressions of sadness were testament not only to this fine aviator's qualities as an individual and the contribution he made to the air force, but also the very special place the BBMF holds in the nation's affections. Its temporary pause on flying operations in the aftermath of this accident was to be expected while investigation gets under way, and, of course, as the personal loss is mourned. When the flight returns to performing its commemorative mission, once the time is deemed right, it will be an understandably emotive occasion. Its motto, 'Lest We Forget,' has seldom seemed more apposite.

And that same Bank Holiday weekend, I was very sorry to learn that Arthur W. J. G. Ord-Hume, aircraft designer, builder, pilot, historian, author and so much more, had passed away. A regular contributor to this magazine throughout its 51 years, Arthur was among the last survivors from the pioneering era soon after the war when private flying was getting back on its feet, and a new generation of homebuilders wanted to restart that movement. Without Arthur, they may never have done so. Our columnist Steve Slater, who knew him well, will offer further tribute next month.

Aeroplane sends its heartfelt condolences to the family, friends and colleagues of both gentlemen.

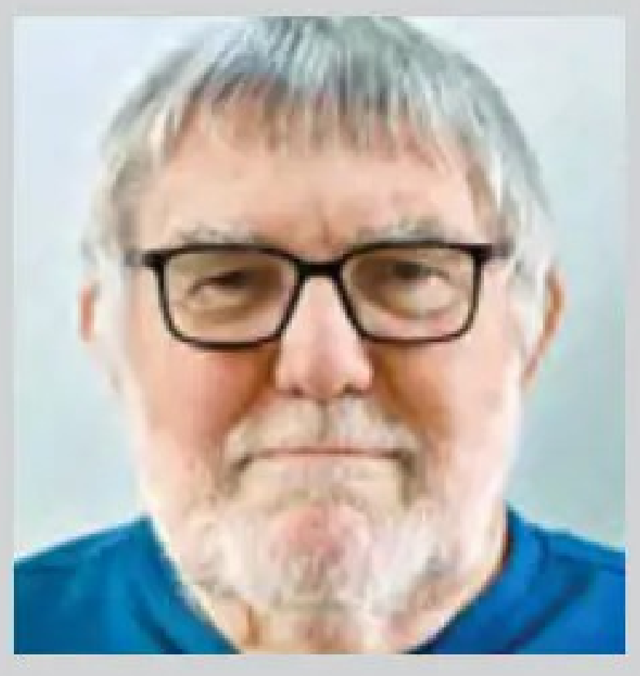
Ben Dunnell

AEROPLANE
ESTABLISHED 1911

Aeroplane traces its lineage back to the weekly *The Aeroplane*, founded by C. G. Grey in 1911 and published until 1968. It was relaunched as a monthly in 1973 by Richard T. Riding, editor for 25 years until 1998.

CONTRIBUTORS THIS MONTH

DENIS J. CALVERT



Denis's interest in the RAF's Thors started in 1972, when he moved to a Cambridgeshire village whose airfield had been a Thor base. Yes, the missiles were long since gone and the emplacements had been stripped, but it was still possible to imagine how it must have been when active, 10 years previously. Fast-forward more than 50 years, he finally felt ready to put pen to paper on the subject of 'the RAF's first ballistic missile'. It's been a long time coming.

JEANNE FRAZER

In 1988, Jeanne was invited to manage The Fighter Collection at Duxford, then the largest private collection of World War Two aircraft in Europe, overseeing its airshow participation and organising the Classic Fighter Display and the early Flying Legends shows. Her involvement with warbirds continued for nearly three decades, including 15 years as Duxford's flying display director where she was responsible for staging numerous large formations. She is privileged to have known so many of the most accomplished warbird pilots on the planet.

JAMES KIGHTLY

The Dornier Do 24 has been of long-term interest, given its surprisingly complex genesis and use throughout World War Two: not least appearing in combat on both sides, and in the Pacific as well as European waters. One of James's most unusual memories is standing chatting with Iren Dornier, grandson of the company's founder, *on* the Do 24 ATT at Biggin Hill watching P7350, the Battle of Britain veteran Spitfire, taxi past. Aviation preservation overwriting war history of Dornier, man and machine.

GRANT NEWMAN

Grant lives in Nelson, New Zealand and is a line maintenance engineer with Air New Zealand on turboprop regional airliners. He recently completed a bachelor of aviation management degree. Grant also works as a freelance aviation researcher, writer and photographer and has done so for more than 25 years. In his past he had employment within the museum sector for nine years, as a research curator with the Department of Research and Information Services (DoRIS) at the RAF Museum and various roles at Scotland's National Museum of Flight.

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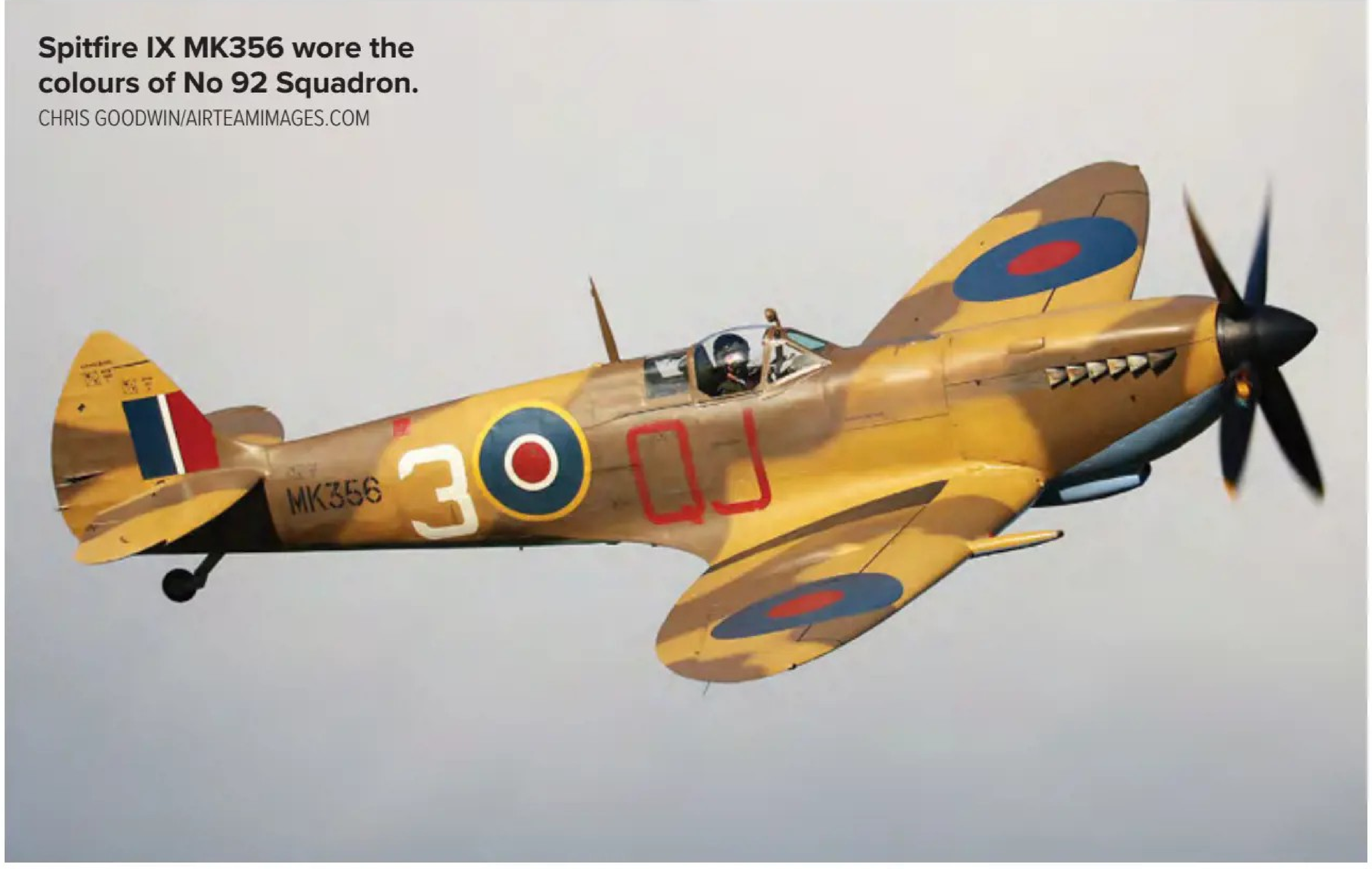
Sqn Ldr Mark Long was the officer commanding designate of the BBMF. CROWN COPYRIGHT



Spitfire IX MK356 wore the colours of No 92 Squadron. CHRIS GOODWIN/AIRTEAMIMAGES.COM

BBMF grounded after fatal Spitfire crash

Following the tragic death of Eurofighter Typhoon pilot Sqn Ldr Mark Long in the crash of Supermarine Spitfire IXe MK356 near RAF Coningsby on 25 May, the entire Battle of Britain Memorial Flight fleet was temporarily grounded the following day. The father of two young girls, Mark Long was due to take over command of the BBMF from current incumbent Sqn Ldr Mark Sugden in October. It was the first fatal accident to befall the flight since it was formed in its original incarnation, as the Historic Aircraft Flight, at Biggin Hill in July 1957.

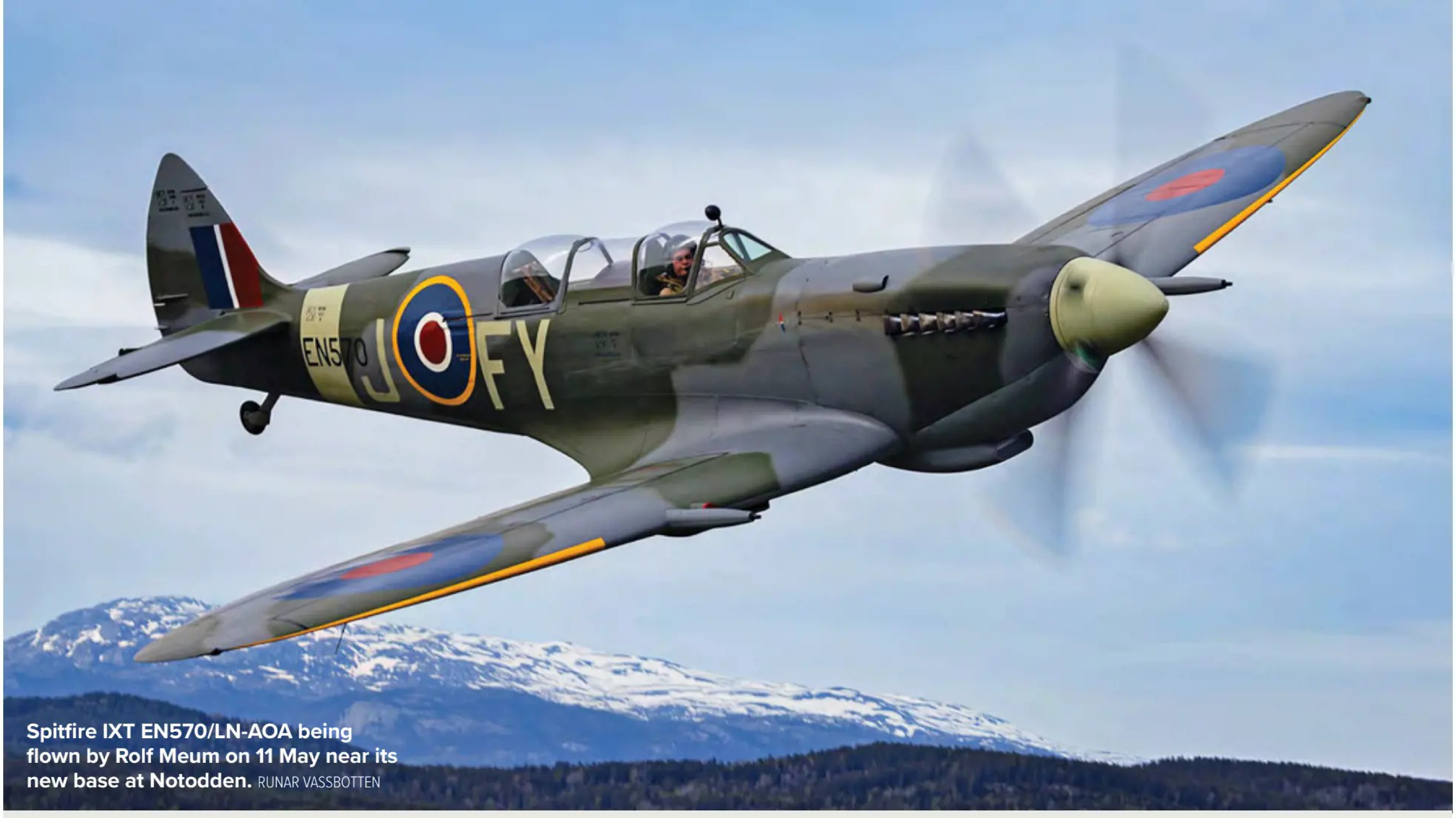
On 26 May Gp Capt Robbie Lees, commander of the RAF's Display Air Wing, said, "Mark was a Typhoon pilot here at RAF Coningsby, and for the last four years he has been a pilot with the Battle of Britain Memorial Flight. A great friend, colleague, and a passionate, professional aviator he will be sorely missed by all that knew him. I would like to extend a sincere thank you to the RAF personnel, and our emergency services colleagues who responded so swiftly yesterday. Our thoughts remain with Mark's family and friends to whom we offer our deepest sympathies."

Spitfire MK356 was operated by No 144 Wing for a two-month period from 14 April to 14 June 1944, from Holmsley in the New Forest, Westhampnett (now Goodwood aerodrome) in Sussex and Ford, before being withdrawn after a wheels-up landing. Post-war it served as a gate guardian at several RAF stations, including Hawkinge, Bicester, Locking and Henlow. It was used statically in the *Battle of Britain* film during 1968, after which it went to the RAF Museum outstation at St Athan. Following transfer to the BBMF and an eight-year rebuild, it flew for the first time in 53 years on 7 November 1997.

CLARENCE E. 'BUD' ANDERSON 1922-2024

Legendary P-51 Mustang pilot and last surviving World War Two triple ace Brig Gen Clarence E. 'Bud' Anderson died at his home in Auburn, California on 17 May at the age of 102. Having learned to fly as part of the Civilian Pilot Training Program in 1941 and been commissioned into the US Army the following year, Anderson was posted to the 328th Fighter Group to fly P-39 Airacobras, it being one of those aircraft that he first named *Old Crow* after a Kentucky bourbon whiskey. Deployed to the 8th Air Force in Britain with the Leiston-based 357th FG in November 1943, he went on to serve two tours there.

Between 5 February and 5 December 1944, flying with the 357th FG's 363rd Fighter Squadron on P-51Cs and Ds all bearing the name *Old Crow*, Anderson shot down a total of 16-and-a-quarter enemy aircraft. After the Korean War he commanded the 69th Fighter-Bomber Squadron at Osan, and during 1970 led the F-105 Thunderchief-equipped 355th Tactical Fighter Wing during the Vietnam conflict. Anderson also flew as a test pilot at both Wright-Patterson AFB and Edwards AFB, rising to become the Air Force Flight Test Center's deputy director of flight test. Having retired from the US Air Force in 1972, in recent years he attended innumerable airshows and reunions on both sides of the Atlantic.



Spitfire IXT EN570/LN-AOA being flown by Rolf Meum on 11 May near its new base at Notodden. RUNAR VASSBOTTEN

Norwegian Flying Aces Spitfire airborne

The Norwegian Flying Aces Supermarine Spitfire IXT, EN570/LN-AOA, arrived at its new home at Notodden in southern Norway on the evening of 10 May in the hands of chief pilot Rolf Meum, two weeks after it had made its maiden post-restoration flight with Pete Kynsey at the helm following a rebuild performed by the Spitfire Company at Biggin Hill.

Coded FY-J, EN570 was operated by the Biggin Hill-based No 611 Squadron from April-June 1943. Norwegian pilot Lt Rolf Torbjørn Tradin shot down a Focke-Wulf Fw 190 in it during a 'Ramrod' sweep over Normandy on 30 May, but fell to the guns of another Fw 190 that had got onto his tail during the dogfight, crashing into the sea near Pont l'Evêque. Just short of two weeks later, on 11 June, EN570 was in turn shot down by an Fw 190, Fg Off Gordon Rowland Lindsay losing his life. The remains of the fighter were recovered from the crash site in the Robermont woods, close to Saint-Pol-sur-Mer, in July 2013.

Tradin had scored one previous victory, shooting down a Junkers Ju 52/3m while flying a Norwegian Gloster Gladiator north of the Oslofjord on 9 April 1940.

IWM

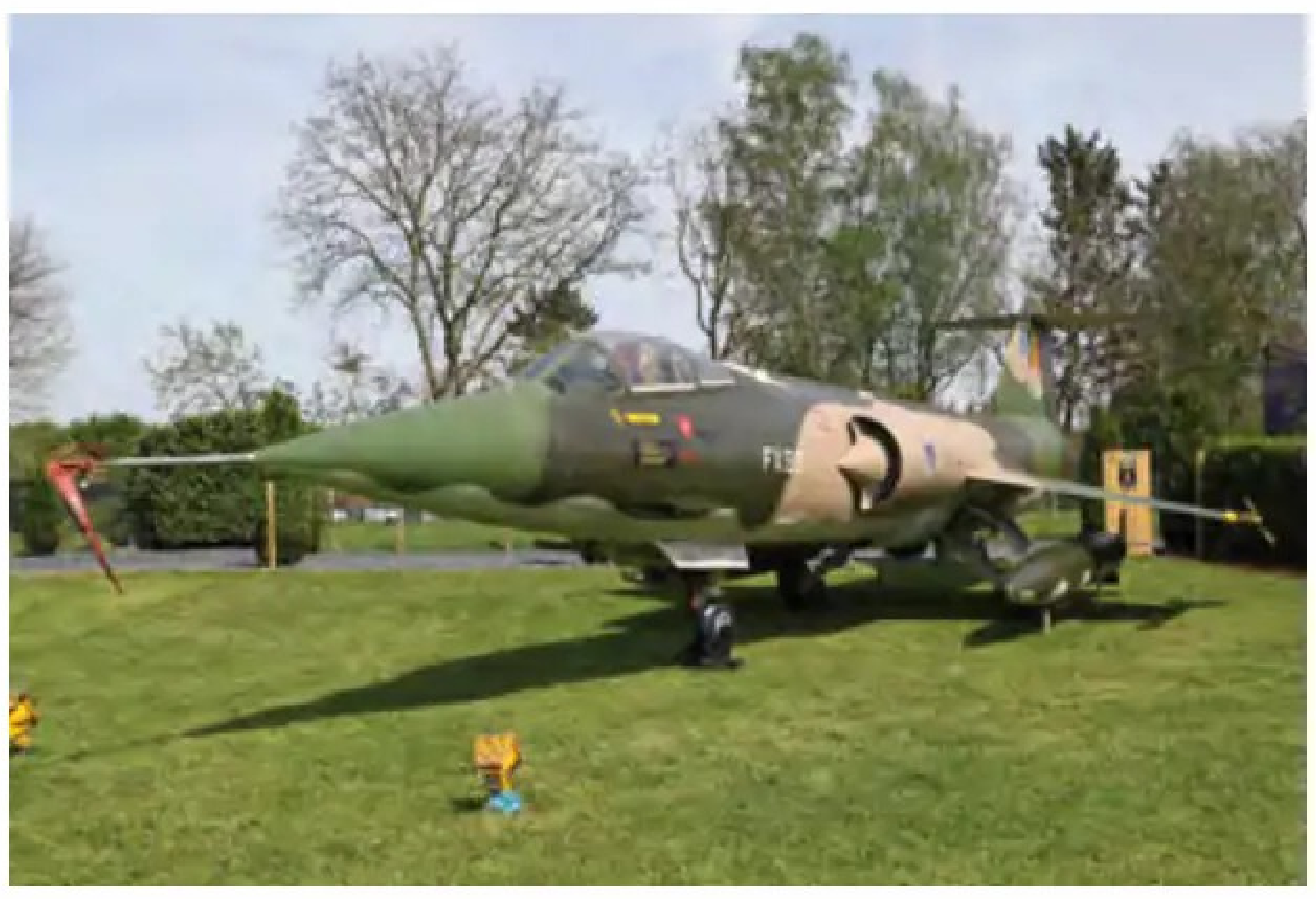
Last operational Belgian Starfighter restored

At Bilzen, Belgium, 20-odd miles north of Liège, Luc Degens has completed restoration of the last Lockheed F-104G Starfighter to fly with the Belgian Air Force, serial FX99 (c/n 9172). It is now on display behind Degens' aviation-themed bed and breakfast business in the town.

FX99 was built under licence by SABCA and delivered to the Belgian Air Force on 2 April 1965, but remained in storage for almost two years before finally entering service with 10 Wing at Kleine Brogel on 12 April 1967. Sixteen years later, on 26 September 1983, the aircraft made the last official F-104G flight with the Belgian Air Force, being ferried by Kapt vl Aerts of 31 'Tiger' Squadron from Kleine Brogel to Koksijde for storage.

During 1987 the aircraft was part of a batch of TF-104Gs and F-104Gs sold to Radcomm Enterprises, which stripped them of all usable parts and abandoned the remains at Koksijde, but FX99 was one of a handful that were shipped to the USA in November 1990 for preservation. It was first noted at Bangor, Maine in 1991, but by 1995 had been acquired by International Vintage Aircraft at Markham airport, Ontario, Canada. The Starfighter later became part of the Canadian Air Sea Land Museum at Ontario, where it began to slowly rot away.

During 2021 two Belgian enthusiasts managed to acquire the aircraft and dismantle and pack it into two containers for shipment back to Belgium. FX99 arrived on their premises at Houthalen-Helchteren in October of that year and they started to reassemble the airframe, but for various reasons they had to abandon the project and it was offered for sale.



A fantastic effort by bed and breakfast proprietor Luc Degens has seen former Belgian Air Force F-104G FX99 transformed into this superb exhibit at Bilzen. LAURENT HEYLIGEN

In August 2022, it was acquired and transported by Luc Degens for restoration and display next to his Antonov An-2TP, SP-FIX. Over an 18-month period, Degens painstakingly repaired all the damage FX99 had suffered during its travels and re-created the scheme it wore during its last flight in 1983. The end result is probably the best-restored F-104G currently on show in Belgium.

Mars for Pima museum

Resplendent in its US Navy scheme, Martin Mars C-FLYK Philippine Mars sits on Sproat Lake, on central Vancouver Island, British Columbia. VIA PASM

Just a month after the 28 March announcement that the British Columbia Aircraft Museum at Victoria International Airport in western Canada had acquired Martin JRM-3 Mars C-FLYL *Hawaii Mars* from Sproat Lake-based Coulson Aviation (see News, *Aeroplane* June 2024), Coulson has donated the world's only other example of the water-bombing leviathan, C-FLYK *Philippine Mars*, to the Pima Air and Space Museum in Tucson, Arizona.

"This has been an exciting month for both Martin Mars water-bombers", said Wayne Coulson, CEO of the Coulson Group. "As a fitting tribute to their years of service and years of hard work by many people in BC and the US, we are pleased to see both Mars aircraft landing to rest at world-class institutions in 2024". Scott Marchand, the CEO at Pima added, "We are pleased to have the *Philippine Mars* join our museum where we will preserve this World War Two-era aircraft for decades to come."

Seven Mars were built for the US Navy between 1942 and 1947, the fleet flying cargo between Hawaii and the Pacific islands to support the US Navy during the Second World War. After hostilities, they aided the Korean War effort with medical air transport lifts between Hawaii and California, later transitioning to cargo lift work before being decommissioned in 1956. The surviving fleet of four was sold in 1958 to a consortium of timber companies in British Columbia, Canada, and converted into the world's largest water-bombers carrying 7,200 US gallons per drop. Coulson purchased two of the aircraft, *Hawaii Mars* and *Philippine Mars*, in 2007, marking the start of the company's fixed-wing air tanker operations for aerial wildfire support.

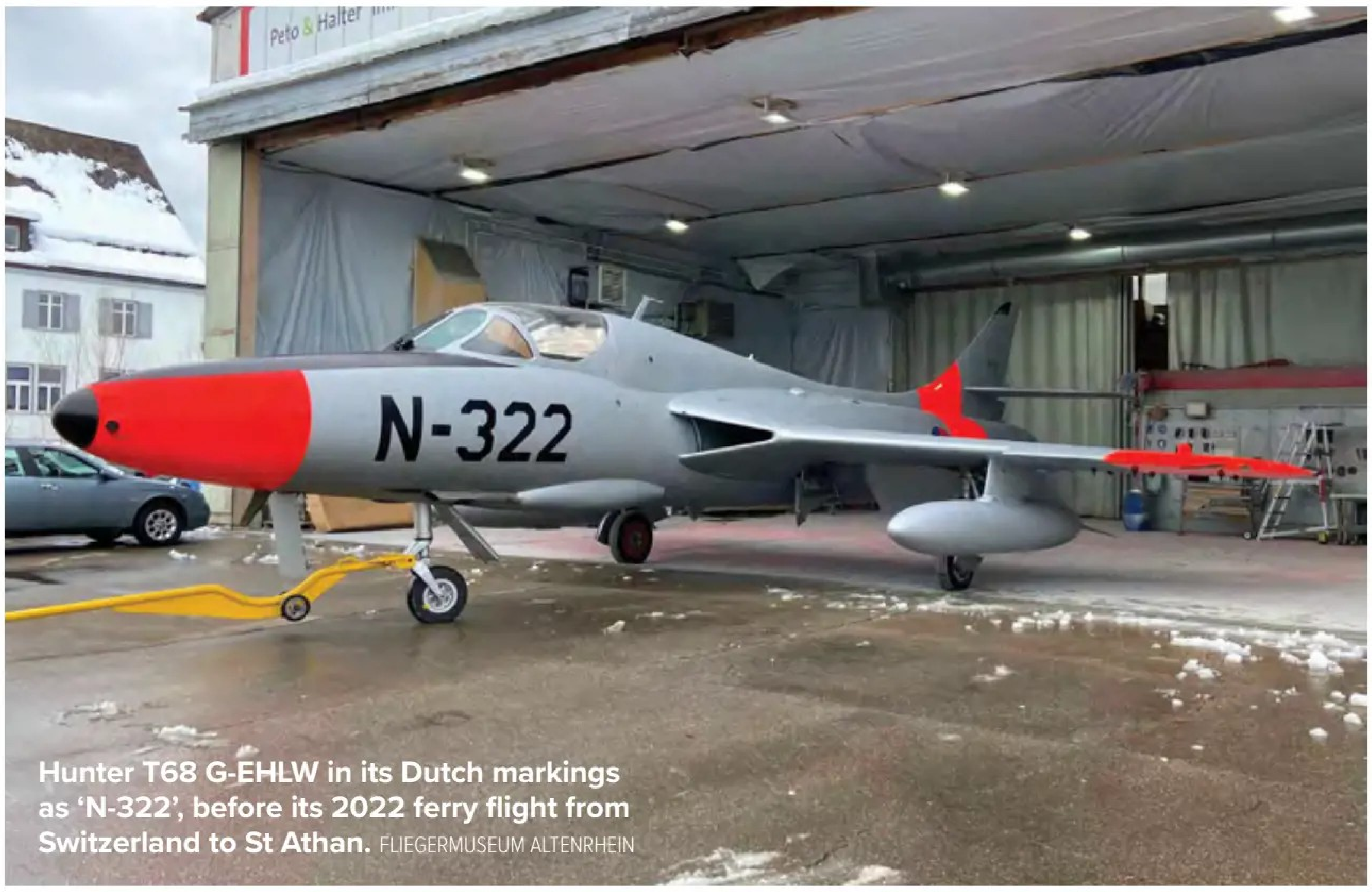
Of the seven built, *Hawaii Mars* and *Philippine Mars* are the only survivors. The latter machine has been repainted into its midnight blue US Navy scheme.

HAWK ARRIVES AT NELSAM

The North East Land Sea and Air Museum (NELSAM) at Sunderland, Tyne and Wear took delivery of BAe Hawk T1A XX265 from storage at RAF Shawbury on 8 May. After being reassembled on site, on 13 May the Hawk was formally gifted by Air Cdre Adam Sansom, AOC North England, on behalf of RAF Heritage to the lord-lieutenant of Tyne and Wear Lucy Winskill, who accepted the Hawk on behalf of the people of the north-east region.

The Hawk, which is in full No 100 Squadron colours, continues to tell the story of the RAF in the region following on from the arrival of Panavia Tornado F3 ZE204 in 2021. Both aircraft were once based at Leeming in North Yorkshire. which is where No 607 (County of Durham) Squadron, Royal Auxiliary Air Force, is today stationed, and whose historical home is the former RAF Usworth, now the site of the museum which itself celebrates its 50th anniversary this year.

ABOVE: Being unloaded at the North East Land Sea and Air Museum on 8 May, Hawk XX265 is an appropriate 50th birthday present for this ever-expanding collection. NELSAM



Hunter T68 G-EHLW in its Dutch markings as 'N-322', before its 2022 ferry flight from Switzerland to St Athan. FLIEGERMUSEUM ALTENRHEIN

Dutch Hunter operator to close its doors

The Dutch Hawker Hunter Foundation announced on 25 May that it has decided to cease operations and to sell Hunter T68 G-EHLW, which has been at Horizon Aircraft Services' premises at St Athan, Wales, since a delivery flight from Altenrhein, Switzerland, in July 2022.

In a statement, the DHHF said, "we were confident that after minor adaptations and modifications the CAA would grant a full permit to fly, and that our new Hunter would arrive at Leeuwarden air base at the end of the summer.

"It has worked out very differently. The way [the] UK CAA has handled our application has taken endless time and effort without any commitment to a timetable or outcome. At this moment, nearly two years after its UK arrival, [the Hunter] is still without a permit to fly and it is unclear if and when this permit will be forthcoming. These delays have over time led to more regulatory and operational issues coming up, such as the continued availability of HAS [Horizon Aircraft Services] as our CAMO [continuous airworthiness management organisation]. Furthermore, the delays have severely impacted our operational organisation, in terms of availability and currency of qualified aircrew and groundcrew.

"Evaluating DHHF's business against the actual state of affairs and future scenarios, the board has concluded that it is no longer possible to operate its Hunter in a way which conforms to the professional standards DHHF has applied without compromise from the start of its Hunter operations in 2007."

> *"After nearly two years, the Hunter is still without a permit to fly"*

The foundation had previously flown Hunter F6A XF515/G-KAXF and T8C XF357/G-BWGL, both in Royal Netherlands Air Force colours. The F6A was sold to Lortie Aviation in Canada during 2022, while the T8C had already been grounded, after which the T68 — formerly J-4205 with the Swiss Air Force, and HB-RVP on the Swiss civil register — was intended as a replacement. It too went into Dutch markings as 'N-322'.

For his part, Horizon Aircraft Services' John Sparks cited a range of factors other than the CAA in a post about the matter on Facebook, such as rising costs in numerous areas, and availability of suitably experienced manpower. ***Ben Dunnell***

Spitfire HFVIIIc MV154 taxies in at Sywell on 4 May following its final flight before shipment to Australia. STEVEN COE

'Spits' leave UK for Australia and Turkey

The only single-seat Spitfire VIII in the UK, Maxi Gainza's MV154/G-BKMI was flown from Duxford to Sywell on 4 May for dismantling ready for export to a new owner in Australia, where it is understood it will be repainted soon after arrival. Since completion of its restoration for Robs Lamplough in the 1990s, the fighter has been finished as MT928.

Spitfire IX TE517/G-RYIX has been acquired by Ali Ismet Öztürk's MSÖ Air & Space Museum at Sivrihisar, 85 miles south of Ankara, and a ferry flight from Sywell was completed on 27 May. Previously owned by 517 Ltd, the former Israeli Air Force machine made its first post-restoration flight from Biggin Hill on 7 April 2023. It, too, is expected to receive a new colour scheme.

Spitfire IX TE517 has now arrived with its new owner in Turkey. BEN DUNNELL

NEWS IN BRIEF

BEVERLEY MOVE BEGINS

The Solway Aviation Museum began moving parts of Blackburn Beverley C1 XB259 from Fort Paull to its Carlisle Airport home in late May, following the success — reported last month — of its fundraising campaign to acquire this last surviving example of the transport.
BEN DUNNELL

RACES MOVE TO ROSWELL

The Reno Air Racing Association announced on 25 May that the National Championship Air Races — run for the last time at Reno, Nevada, last year — will resume in 2025 at Roswell, New Mexico. The venue will be the Roswell Air Center, the former Roswell Army Airfield and Walker Air Force Base. Dates are still to be confirmed. BD

NASA DC-8 MAKES FINAL FLIGHT

One of the world's last flying Douglas DC-8s, NASA's DC-8-82 N817NA, completed its final flight on 15 May when it was delivered to Idaho State University. The 1969-built aircraft, which was acquired by NASA in 1985 and served as a flying laboratory for 37 years, was ferried from the Armstrong Flight Research Center at Edwards AFB, California to Pocatello Regional Airport, Idaho, where it will be used by the university's Aircraft Maintenance Technology Program. BD

'SPOOKY' SKYTRAIN TO CAF

The Commemorative Air Force's Gulf Coast Wing at Conroe, Texas has acquired ex-US Navy Douglas R4D-6 N514AC, which is partly configured and painted as a US Air Force AC-47 'Spooky' gunship from the Vietnam War.
BD

Apache unveiled at Wallop

Probably the most menacing aircraft exhibit in any British aviation museum, Apache AH1 ZJ224 was unveiled on 14 May. AFM

Westland-built Apache AH1 ZJ224 was unveiled at the Army Flying Museum at Middle Wallop in the presence of King Charles III on 14 May. The Apache completes the line-up of attack helicopters at the museum.

The last of 67 Apache AH1s delivered to the Army Air Corps was retired from service during March 2024. Its replacement is the AH-64E Guardian, boasting more powerful engines, giving the new machine a greater service ceiling, longer range and a higher top speed.

Maj Gen Neil Sexton, chairman of the Army Flying Museum says of the acquisition, "We have worked for many years to ensure that when the Apache AH1 was retired, we would be its custodians. Conserving and allowing the general public to view the airframe and its story will serve as a fitting tribute to a helicopter that played a significant role in the lives of so many men and women who have served in our armed forces, and in British military history."

ZJ224 will be the only Apache AH1 to be preserved in the UK, with many of its fellow airframes being modified to AH-64E specification by Boeing in Mesa, Arizona. The museum airframe has a distinguished history with 656 Squadron, Army Air Corps in Afghanistan. On 15 January 2007, it was one of two Apaches that carried troops on their stub wings into Jugroom Fort, Helmand Province, to rescue a fatally wounded comrade.

DEMOISELLE REPLICA GOES ON SHOW IN FINLAND

With DC-2 c/n 1354 *Hanssin-Jukka* wearing its 'Air Force One' Winter War Finnish Air Force markings as a backdrop, the Demoiselle No 20 makes for an interesting addition to the Tuulonen shopping centre.
KIMMO SALOMAA VIA JANNE SALONEN

A full-scale replica Demoiselle No 20 recently went on display at the Tuulonen shopping centre, between the cities of Tampere and Lahti, next to the historic Douglas DC-2 *Hanssin-Jukka*. The Demoiselle has been donated to the Aviation Museum Society Finland by the Museum Centre Vapriikki of Tampere. Constructed around the turn of the century by a team of museum volunteers, the replica was built to recall the first powered aircraft imported to Finland in 1911.

An improved variant of the original, the Demoiselle No 20, appeared in 1909, with about 15 being built. One Demoiselle No 20, powered by a Darracq engine, was imported to Finland by the Sergei Nikolajeff car dealership and sold to the sculptor Adolf Aarno. Between 1911 and 1914, Aarno made several unsuccessful attempts to fly the Demoiselle from the icy surface of Lake Pyhäjärvi near Tampere. During an engine run on 8 March 1914, it was damaged beyond repair by strong winds.

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D-Day Squadron arrives in UK

Four Douglas C-47s/DC-3s made the Atlantic crossing from Oxford, Connecticut to North Weald, Essex in late May to take part in the 80th anniversary commemorations of Operation 'Overlord'. Accompanied by a pair of C-47s from North Weald-based Aero Legends, they were due to depart for France on 2 June.

The initial part of the trans-Atlantic fleet comprised C-47As N74589 *Placid Lassie* of the Tunison Foundation and N47TB *That's All Brother* belonging to the Commemorative Air Force's Central Texas Wing, together with DC-3s N8336C *Spirit of Douglas*, recently acquired by a private owner from New Zealand, and NC33644, bought last year by Tim Savage, in its original Western Air Lines colours. It was hoped that Hugo Mathys' C-47 N150D would join them in Britain prior to the trip to Normandy, while the Commemorative Air Force's R4D-6S N151ZE *Ready 4 Duty* was being delayed in Oxford by the need for a number two engine change.

The first major engagement for the D-Day Squadron in Britain was at Old Warden for the Shuttleworth Collection's specially organised D-Day Weekend on 25-26 May, the four aircraft making formation flypasts on arrival and departure. In between they were available for close-up public inspection. ***Ben Dunnell***

Placid Lassie **leads the D-Day Squadron line at Old Warden on the Spring Bank Holiday weekend.** BEN DUNNELL

P-40E flies in Belgium

Curtiss P-40E Warhawk OO-WHK made its first public flying appearance in Belgium during the annual Stampe Fly-in at Antwerp-Deurne airport on 11 May.

The fighter, c/n 16786, was built for the US Army Air Forces as serial 41-13570, but entered service with the Soviet Air Force as 'White 51' on 23 January 1942. That June it was shot down, ditching in a fresh-water lake near Murmansk where it was abandoned. Fifty-five years later, the intact airframe and engine were lifted from the lake by a Russian Kamov Ka-25 helicopter.

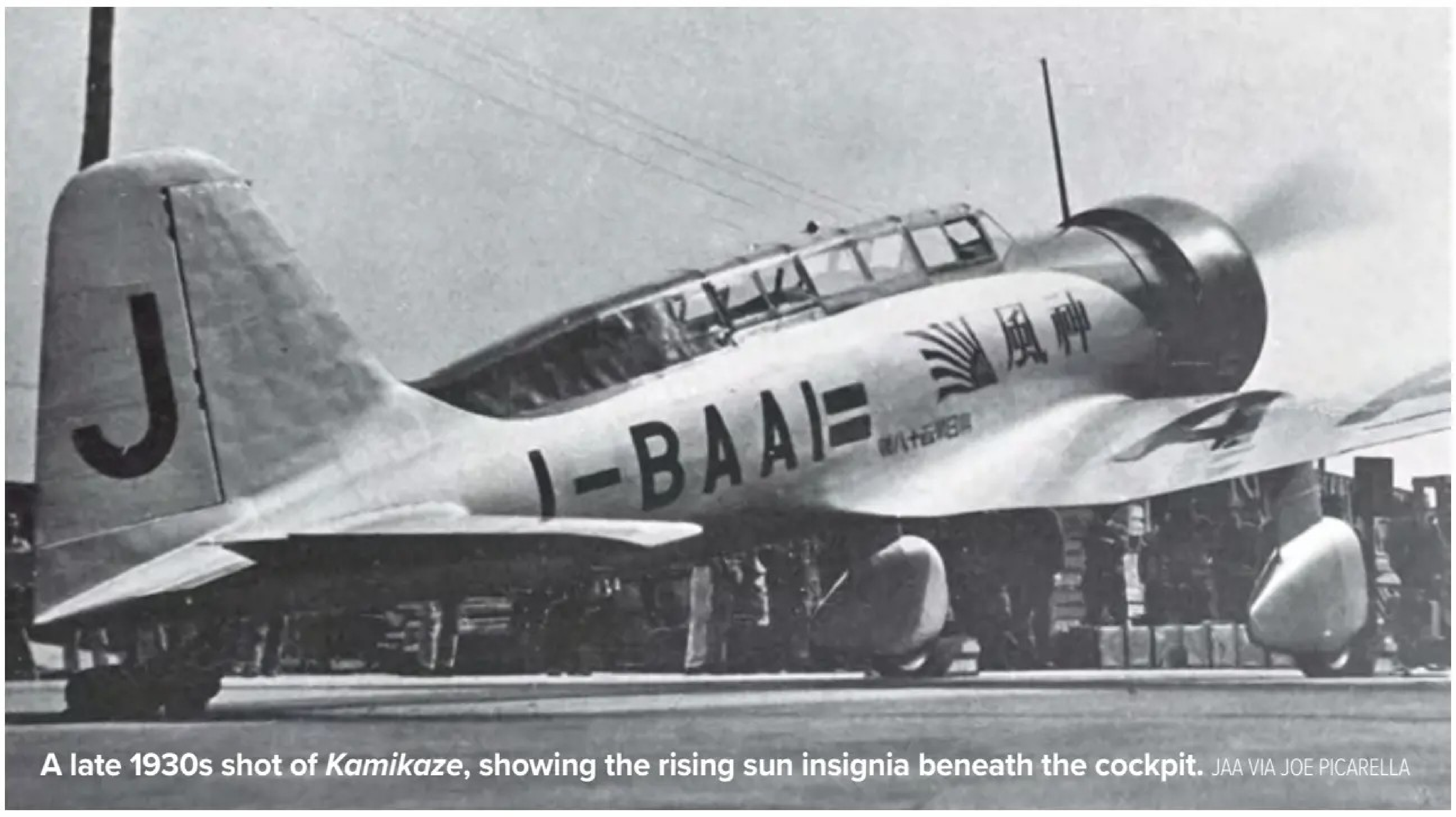
Between 1998 and 1999 the wreck was displayed at the Frontline Aviation Museum at Sandown, Isle of Wight. In 2000 it left for the US, where a first attempt was made to restore it to airworthiness in Missouri, but that was abandoned and in September 2015 it was shipped to Pioneer Aero at Ardmore, New Zealand, a second restoration getting under way for a new Italian owner, Claudio Coltri. During the rebuild, 41-13570 was converted to a two-seater with dual controls.

The Warhawk was allocated the New Zealand registration ZK-MOM for the test-flying programme on 14 May 2021, and on 11 November that year it made a successful test flight in New Zealand. The New Zealand registration was cancelled on 11 August 2022 and the aircraft disassembled and shipped to FAST Aero at Brasschaat, Belgium for some finishing touches before going to its new owner.

The P-40 was registered F-AYKH on 23 September 2023 and first shown to the public statically the next day at the Flying Festival at Brasschaat. Over the winter, work continued on the aircraft and on 6 March 2024 a maiden local test flight was made, but Claudio Coltri then decided to put the aeroplane up for sale, and it was soon acquired by a new Belgian owner. The French identity was cancelled on 30 April and the Warhawk received the Belgian registration OO-WHK on 26 April.

P-40E Warhawk 41-13570/OO-WHK about to get airborne during its first public flying appearance in Europe at Antwerp-Deurne airport on 11 May. LAURENT HEYLIGEN

Kamikaze's return



A late 1930s shot of *Kamikaze*, showing the rising sun insignia beneath the cockpit. JAA VIA JOE PICARELLA

The Mitsubishi Heavy Industries Historic Archives recently placed an aviation artefact of international importance on public display in Yokohama. The item in question is a skin panel belonging to the record-breaking Mitsubishi Ki-15 Karigane J-BAAI *Kamikaze*, which, from 6-10 April 1937, undertook the gruelling 9,540-mile flight between Tokyo to London to celebrate the coronation of King George VI.

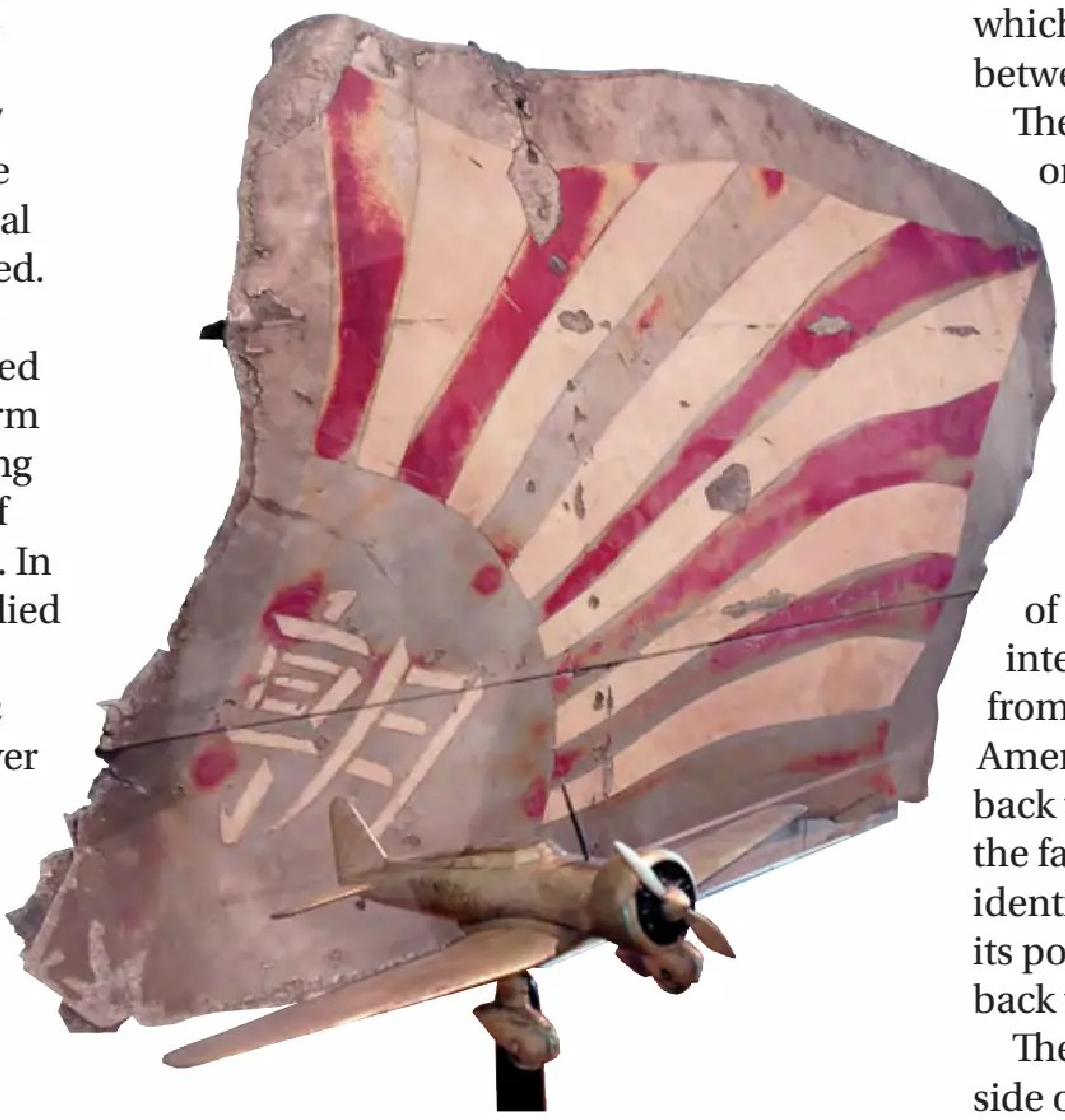
The exploits of *Kamikaze* and its crew of pilot Masaaki Iinuma and navigator Kenji Tsukagoshi captured the imagination of the Japanese people during a period of economic turmoil and political insecurity. The whole concept of the coronation flight — detailed in the July 2023 *Aeroplane* — was initiated by the aviation department of the *Asahi Shimbun* newspaper, in the hope that such an event would raise Japanese national pride. The paper would, of course, report on the unfolding events. *Kamikaze* achieved this aim and in doing so, gained Japan's first Fédération Aéronautique Internationale record for the flight, which took 94 hours 17 minutes, with an actual flight time of 51 hours 19 minutes and 23 seconds at an average speed of 101mph. *Kamikaze* was the second prototype (c/n 1502) of the Ki-15, the world's first high-speed strategic reconnaissance aircraft, an Imperial Japanese Army type designed specifically to undertake photographic missions deep inside enemy territory, immune from interception by virtue of its high performance alone.

After returning to Japan on 21 May 1937 *Kamikaze*, with its striking silver-and-blue colour scheme, instantly became a national icon and drew crowds wherever it appeared. But following the start of the second Sino-Japanese war in July, *Kamikaze* was recalled into service for the army in order to perform reconnaissance duties and assist in training reconnaissance crews while production of new Ki-15 airframes was slowly increased. In this role the aircraft received a hastily applied camouflage scheme, which was painted around the *Kamikaze* and *Asahi Shimbun* markings, giving the impression that a silver banner had been applied to the fuselage.

Disaster struck on 6 November when the aircraft was badly damaged at Tachiarai Army Airfield following an engine failure during take-off. Iinuma and Tsukagoshi attempted a landing on muddy turf, which resulted in the aircraft flipping over onto its back. Both men were dazed but escaped with only minor injuries. *Kamikaze* did not fare so well and the damage was deemed almost beyond economic repair. However, *Asahi Shimbun* realised the publicity value of the aircraft and decided to have it restored to airworthy condition regardless of the cost.

On 3 March 1938, *Kamikaze* was rolled out for a second time complete with new camouflage, but its military service would be brief. The aircraft was soon repainted in its civilian markings for a second time, before resuming its role as the *Asahi Shimbun* flagship for another 18 months.

While performing a courier mission from Taipei to Hakata on 6 October 1939, the crew of the day became lost in bad weather and crashed into the sea just off the coast of southern Formosa (Taiwan). The pilot narrowly escaped death, but the navigator's body was never found. Once again the aircraft was returned to Mitsubishi for restoration, but this time, the damage and saltwater corrosion rendered the airframe unsafe and it was decided to proceed with a static restoration only, which resulted in a mismatch of various Ki-15-II production parts being fitted. Once completed the aircraft was displayed at the Yasukuni Shrine for a few months, before being moved to the TouGou Shrine at Harajuku, Tokyo. Finally, on 20 October 1940, the aircraft was placed on display in the *Kamikaze* Memorial Hall, which had been built on Mount Ikoma, between Osaka and Nara Prefectures.



ABOVE: Amazingly still sporting pre-war paint, the section of Ki-15 *Kamikaze*'s fuselage skin, and an original model of the aeroplane, now on display at the Mitsubishi Heavy Industries Historic Archives in Yokohama. TAIZOU NAKAMURA

The aircraft survived the Pacific War with only minor damage sustained during Allied raids, but under the terms of the occupation, all activities concerning aviation were prohibited. During the autumn of 1945, *Kamikaze* was removed from display and burned by US soldiers in the road outside the memorial hall.

But it would seem the destruction of the aircraft was not as thorough as intended, as the surviving panel was cut from the burnt wreckage by a member of the American military and subsequently taken back to the USA as a war trophy. Fortunately, the family of this serviceman was able to identify the unusual item and, recognising its potential importance to Japan, donated it back to Mitsubishi in 2021.

The 2ft by 15in skin panel is from the port side of the fuselage, the exterior face carrying the *Asahi Shimbun* flag motif. It is fitting that this single panel from the legendary *Kamikaze* now represents the only known surviving component of 498 Mitsubishi Ki-15s built. ***Joe Picarella***

RISING STAR

A group in the Netherlands hopes to get an F-104G Starfighter flying again — and it came about in part thanks to the air force

WORDS: MIKE SHREEVE

F-104G D-8114 outside at Volkel a couple of years ago, looking every inch the active aircraft it will hopefully become. THEO VAN DEN BOOMEN

In a hangar at the Royal Netherlands Air Force fighter base at Volkel, a volunteer team is heading towards bringing an F-104G Starfighter back to fully operational status, with the eventual aim of flying it once again. The group working on the aircraft consists of around 25 people, including two former F-104 pilots, Hans Ruijgrok and Hans van der Werf. The remainder, in roughly equal parts, are retired Dutch F-104 technicians, present-day personnel assigned to the F-16 Fighting Falcon or F-35 Lightning II fleets — the types presently operated from Volkel — and civilians who worked either in the air force supporting other types or for the manufacturers of the aircraft's sub-systems, such as Litton, which made the F-104G's inertial navigation system.

The project traces its origins back to 1999 when the deputy base commander at Volkel, Lt Col Emile van Duren, wished to have a number of representative types prepared for mounting on poles on the road from the main entrance. The original plan was for seven aircraft, but only three poles were placed and no progress made. In 2004, the Historische Vliegtuigen Volkel (HVV, Historical Aircraft Volkel) group was formed to see it through. Initially, F-104G serial D-8279 was refurbished for display and the nose of D-8256 prepared to be exhibited in the station museum, the Historical Room Typhoon. Later an F-16A, J-240, and an F-84F Thunderstreak, P-248, were restored and added to the line-up along the road. The last aircraft, the F-84F, was unveiled by Maj Gen van Duren, by now deputy commander of the Koninklijke Luchtmacht (KLu), in 2014. Other, smaller projects have been undertaken including the preparation of a damaged Napier Sabre engine from a crashed Hawker Typhoon for museum display.

> ***“The deputy commander of the air force said, ‘Why not fly it?’”***

The hangar HVV is housed in is itself an interesting historical artefact, a concrete structure built by the Germans in 1942 and known as a Deisel hangar. The airfield was constructed for the Luftwaffe and used by Ju 88s, followed by Me 262 and Ar 234 jets. After liberation by the Allies, RAF Typhoons and Tempests flew from Volkel before it was taken over by the Dutch military post-war.

While the pole-mounted aeroplanes were being tackled, HVV had the idea of refurbishing an F-104 to be kept on the base, preferably in taxiable condition. When the idea was raised with van Duren in 2014 during the F-84F's unveiling, his response was, “why not fly it?” The original airframe obtained from storage at Volkel in 2004 was D-8312, with D-8063 being cannibalised for parts. But it was found that D-8312 was in very poor condition, having spent a considerable time in outside storage, and it was deemed unsuitable. The search then began for a better aircraft.

D-8114 had been used as an instructional airframe at the technical university in Delft for a number of years after retirement. Returned to the KLu when it was replaced by a retired F-16, it was placed in storage with the then Militaire Luchtvaart Museum at Soesterberg. An initial inspection showed it to be in generally good condition, and the aircraft was handed over to HVV and moved to Volkel in 2013 for restoration.

Unfortunately, at some point many of the wiring harnesses had been cut through. This led to a choice as to whether the severed wires should be replaced or repaired. It was decided they would be repaired as complete replacement would be a complex, multi-year task. While the repaired wiring is suitable for ground use, if the decision is taken to fly the aircraft in future the damaged wires will have to be replaced.

In the meantime, the airframe of D-8114 has been totally overhauled, with all the electrics and hydraulics being returned to operational status. It is presently configured with underwing and under-fuselage pylons, and replacement tip tanks have been added. Tyres have been sourced from cut-down F-16 examples, and certified for the F-104's high landing speed.

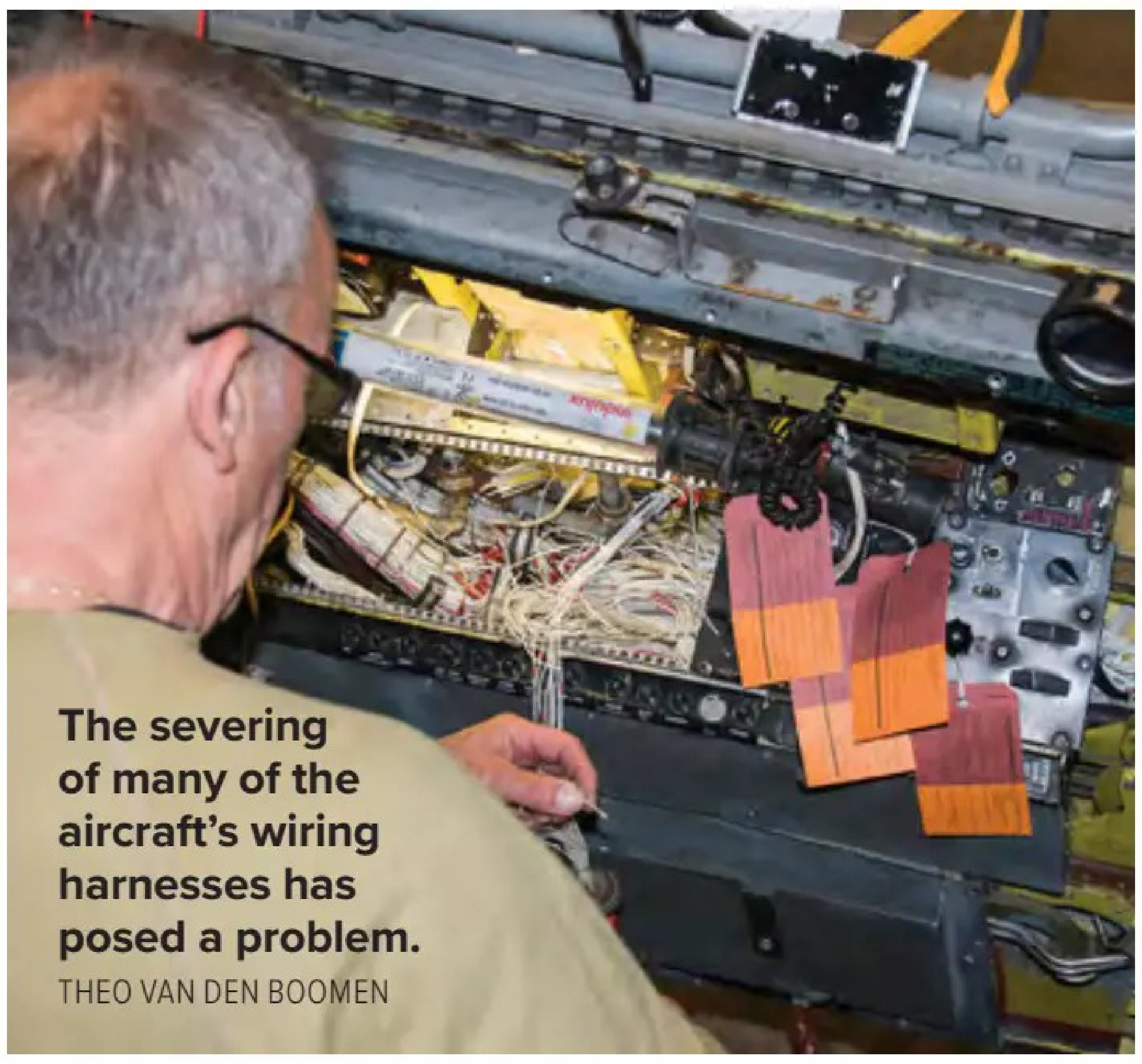
As well as the airframe, many of the sub-systems have been refurbished. These include the Litton LN3 inertial navigation system, of which HVV now has three functional sets — it believes them to be the only currently operational ones anywhere. One is fitted in the aircraft, another is displayed next to it, and the third is held in store. HVV has restored the aircraft's NASARR (North American Search and Ranging Radar) system and its computer, a bulky device situated in the bay behind the cockpit. The General Electric M61 Vulcan 20mm six-barrel cannon has been refitted, with the concession that the connection which would allow it to be made functional has been left off.

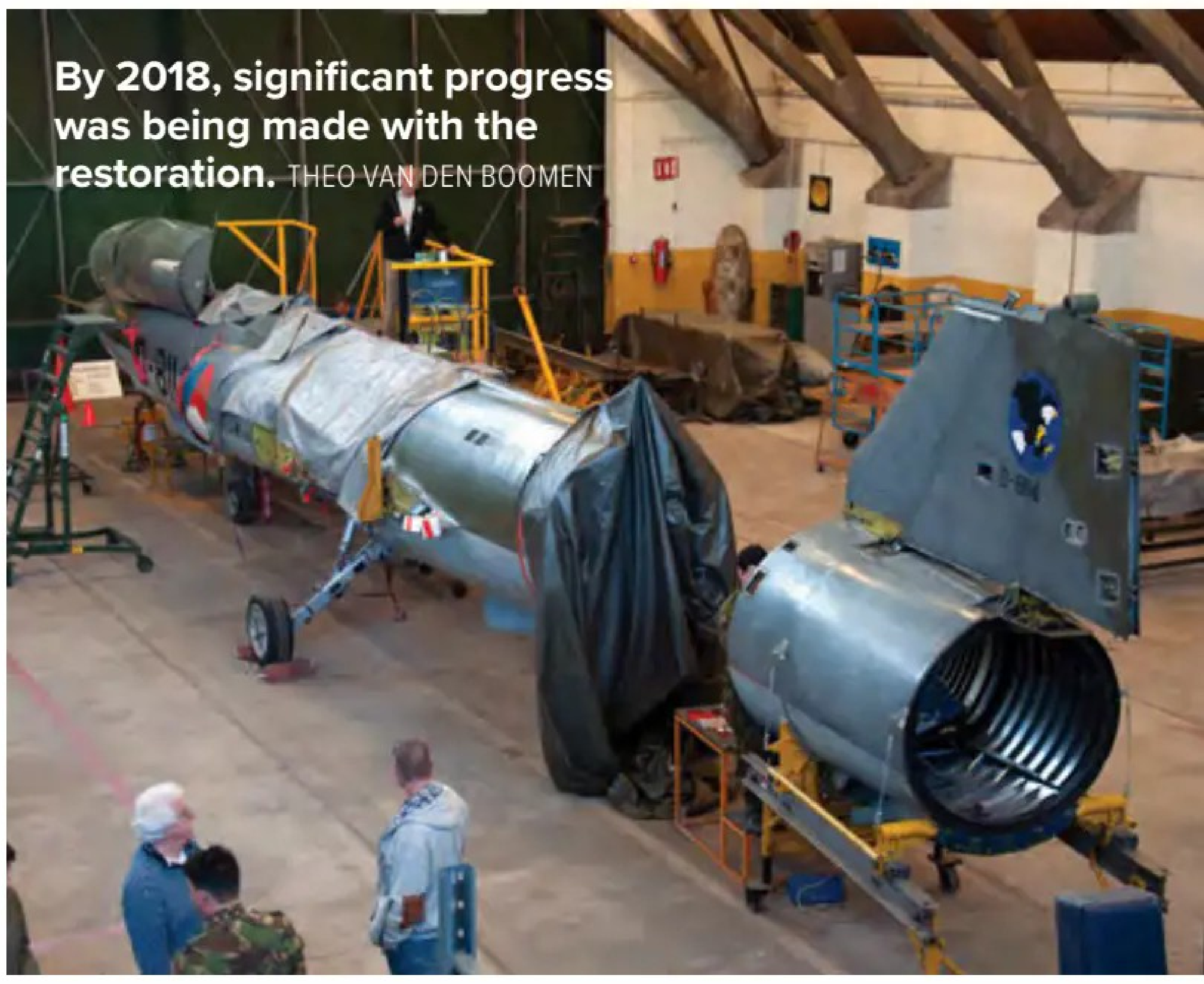
◆

The group has an example of the indigenous Orpheus reconnaissance pod, developed as a collaboration between optical company De Oude Delft, the Dutch National Aerospace Laboratory (NLR) and Fokker. This contained a series of daylight optical cameras as well as an infra-red line-scan and was used on RF-104Gs flown by 306 Squadron at Volkel, replacing the original cameras built into the fuselage, and later on the squadron's F-16s. It has been put back to fully operational capability by HVV.

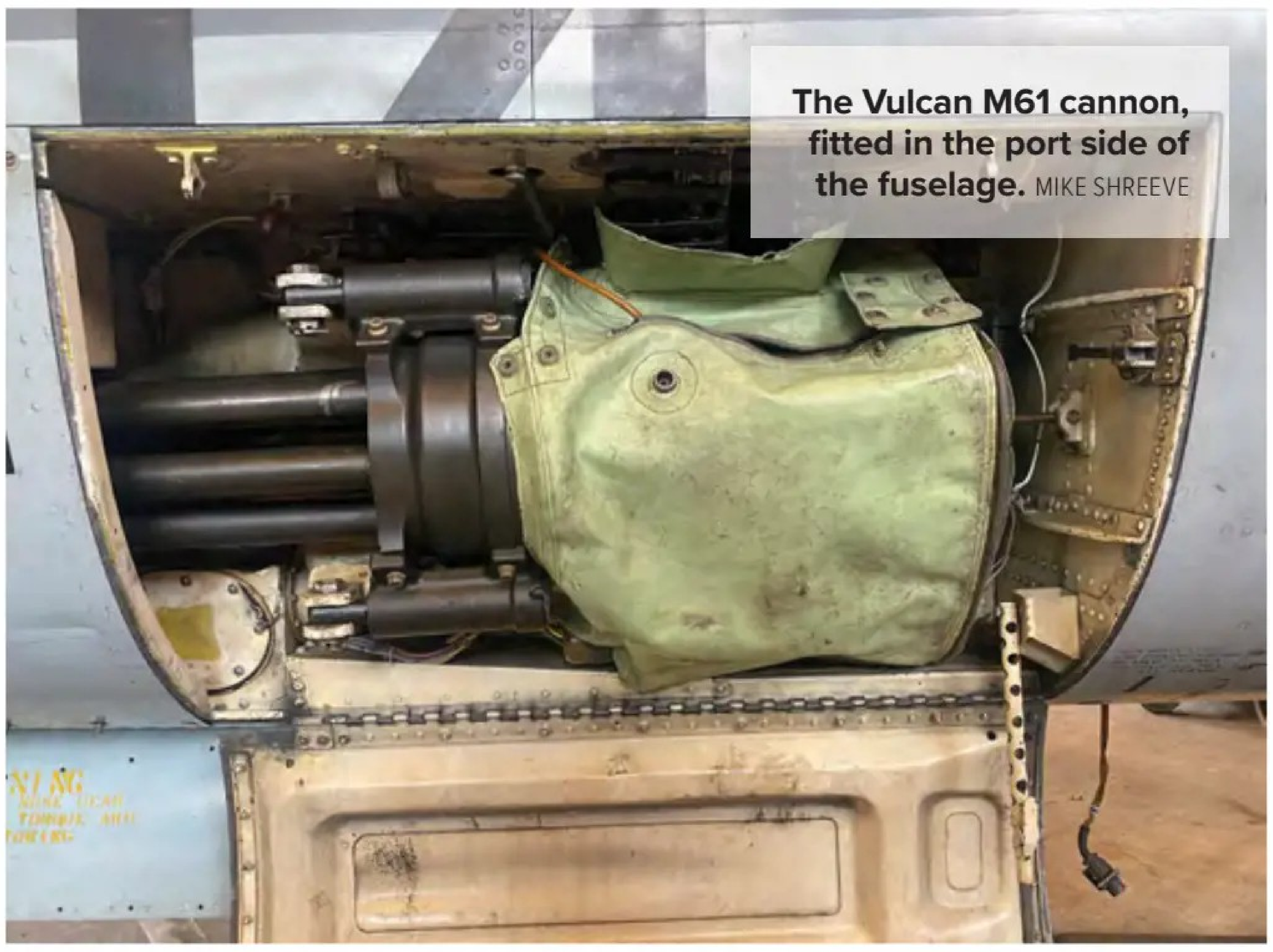
With the plan to return the F-104 to airworthy status, the KLu was approached with the intention of operating it under its auspices as a military aircraft. A business case was presented in September 2015 to fly examples of single- and two-seat Starfighters under such an arrangement. HVV was told this would not be possible, but that a model akin to the Dutch Hawker Hunter Foundation would be considered. At the time the DHHF flew two Hunters, which were civil-registered, from the KLu base at Leeuwarden. With HVV being a military operation and thus not allowed to finance the project, a civilian organisation, the Dutch Starfighter Foundation, was set up in 2018 with Hans van der Werf as chairman in order to provide funding.

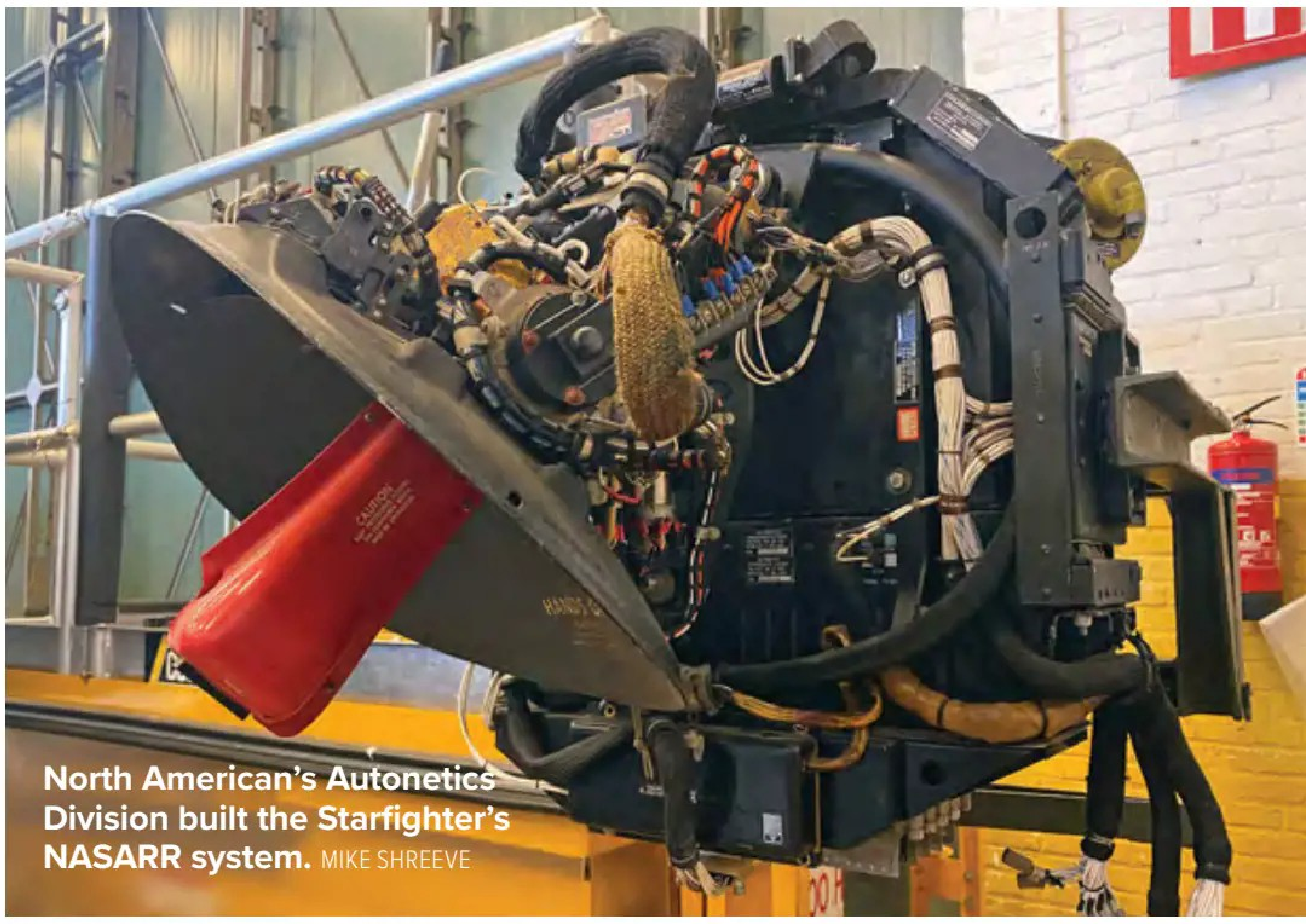
Former KLu Starfighter display pilot Hans van der Werf, a leading light of the project, in the cockpit of the F-104. MIKE SHREEVE


The severing of many of the aircraft's wiring harnesses has posed a problem. THEO VAN DEN BOOMEN


By 2018, significant progress was being made with the restoration. THEO VAN DEN BOOMEN

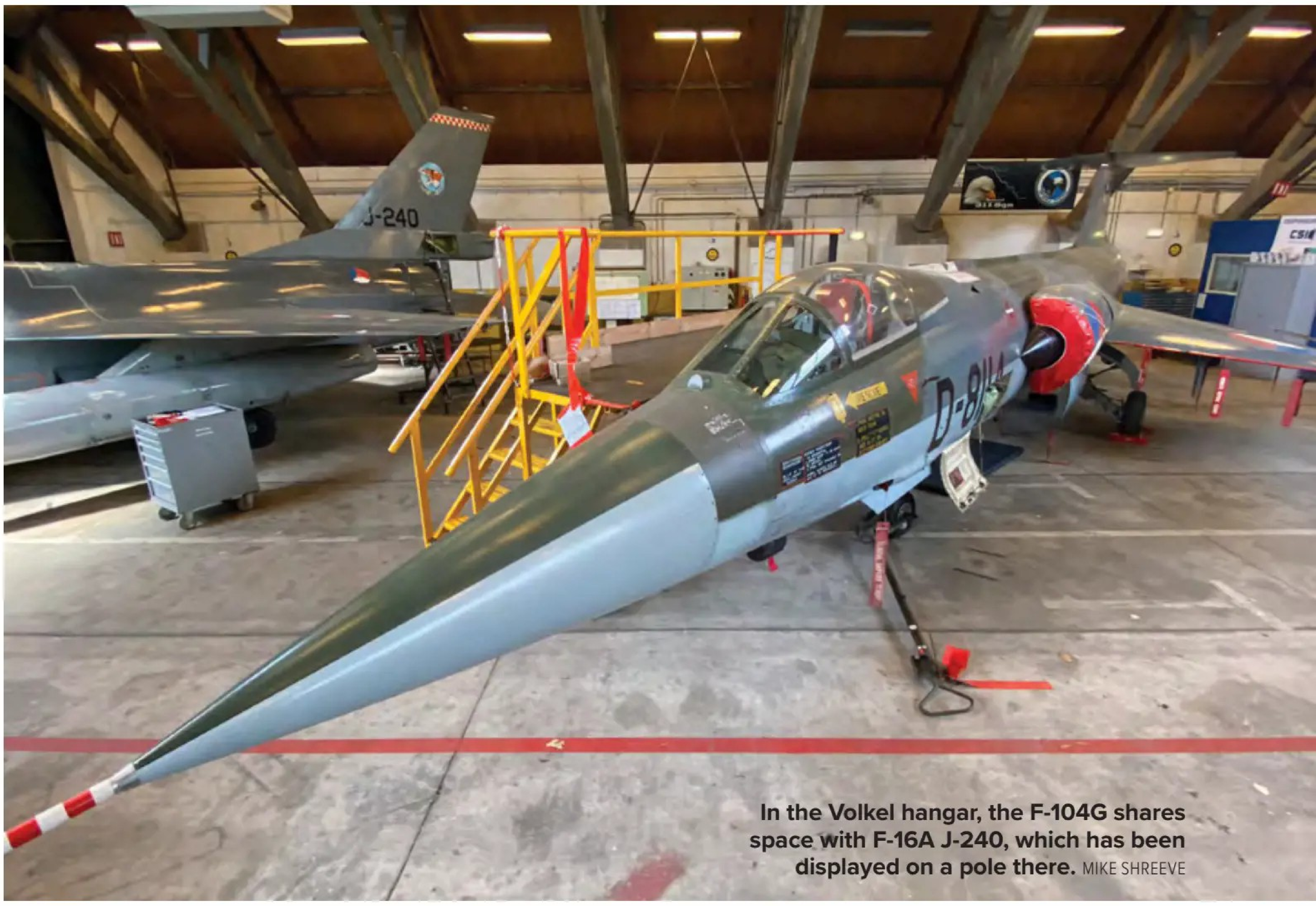
One major issue is the lack of an engine. When the aircraft was transported to Volkel it had the afterburner installed but not the General Electric J79 powerplant itself, which was retained by the museum at Soesterberg. After searching for a suitable replacement, in late 2018 HVV was contacted by Robin Sipe of S&S Turbines in Canada, who offered to provide an ex-KLu J79 free of charge. S&S overhauls J79s and their LM1500 industrial equivalent engines as its main business. It had obtained 21 ex-F-104 units from the Netherlands and kept them in storage ever since. During the transfer, the paperwork for the engines remained with the Dutch military and was later destroyed. S&S offered to perform a full inspect and repair as necessary (IRAN) regime on the one given to HVV and certify it for 400 hours of operation. The Dutch Starfighter Foundation furnished the funding and it was duly carried out in 2019-20. Unfortunately, permission was refused by the Dutch authorities to import the engine into the country due to the possible presence of hexavalent chromium (chrome 6), a known carcinogen, although HVV has stated it does not have chrome 6 in its design. The Dutch military has told the team the engine will not end up in its inventory, so it looks like the end of this avenue to obtain one.


The Vulcan M61 cannon, fitted in the port side of the fuselage. MIKE SHREEVE


North American's Autonetics Division built the Starfighter's NASARR system. MIKE SHREEVE

> *A civilian organisation was set up in order to provide funding*

Part of the stock of F-104 wheels fitted with modified F-16 tyres. MIKE SHREEVE


In the Volkel hangar, the F-104G shares space with F-16A J-240, which has been displayed on a pole there. MIKE SHREEVE

Problems such as the possibilities of asbestos and radiation being in the aircraft have been dealt with after proving the case to the relevant bodies. Another is that, as the F-104 is an American aircraft, any transfer of parts falls under the International Traffic in Arms (ITAR) regulations, which complicates matters further. HVV has collected a vast number of manuals and drawings which it has archived and is in the process of digitising.

Adding to the single-seater, the organisation has been offered a complete ex-KLu two-seat TF-104G. This aircraft, D-5810, was used as an instructional airframe by the aeronautical college at Hoofddorp near Amsterdam for some years after retirement, prior to being returned to the air force. It was later sold privately and exported to the USA. D-5810 is now owned by Steve Alex and has been under restoration in Bangor, Maine since 2013, but was put up for sale a while back. HVV has investors lined up to fund the purchase, but is unable to move forward until it has approval to work in the same way as the Hunter team did at Leeuwarden. The latest statement from the military is that HVV will not be allowed to operate D-5810 at Volkel. It has asked if it will be allowed to move it to Volkel as a static aircraft, and a reply is awaited.

A project to exchange the pole-mounted F-16 at Volkel is HVV's other present undertaking. The weather has taken its toll on the original aircraft, J-240, over the years, so it has recently been removed from its position and brought into the hangar alongside the F-104. Its replacement will be J-616, the first F-16 delivered to Volkel when the type entered service there. In the meantime, before J-240 is handed back to the air force any useful parts are being removed for use on J-616.

HVV has tackled many obstacles during the course of the project to put a Starfighter back in Dutch skies. It still has significant hurdles to overcome, but is not giving up on its dream.

Thanks to Theo Rombout, Hans Ruijgrok and Hans van der Werf. For more details, see historicalfighters.com or dutchstarfighterfoundation.nl

STEVE SLATER

Hangar Talk

A vintage light aircraft pilot and operator's view on historic aviation

Messenger G-AKIN on a visit to Old Warden this May, one of its first outings in the Hardwicks' ownership. BEN DUNNELL

The announcements that the last two airworthy water-bomber examples of the Martin JRM-3 Mars will be preserved are some of the best pieces of historic aviation news in the past month. Visitors to the British Columbia Aviation Museum and the Pima Air and Space Museum will marvel at the scale of these machines, the Mars' wingspan of 200ft dwarfing that of other large flying boats such as the Short Sunderland at 120ft, not to mention the Consolidated PBY Catalina at a 'mere' 112ft. But there's also been a happy development relating to a type somewhat smaller, with a wingspan of just 36ft, but no less noteworthy: Miles Messenger G-AKIN is due to remain at Sywell aerodrome in Northamptonshire, its home for the past seven decades.

Messenger 'India November' was built and registered to its manufacturer on 19 September 1947. It was the penultimate airframe of its type to be constructed at Newtownards, Northern Ireland, before being finished by Miles Aircraft at its headquarters at Woodley in Berkshire. Powered by a Blackburn Cirrus Major III of 155hp, the Messenger's first owners were the Everard family of Leicester brewers, who owned it for a year from April 1948 before, in April 1949, it was sold to the Spillers of Keystone, a Huntingdonshire farming family. All four Spiller brothers were private pilots at that time. The last of them to relinquish his pilot's licence was the youngest brother, Norman, who gifted the historic Miles to the Sywell Messenger Trust during 2002. It is believed only DH60X Moth G-EBWD, which was bought by Richard Shuttleworth in the 1930s and remains resident at Old Warden, has enjoyed a longer period of continuous operation from a single UK airfield.

As with the larger, twin-engined Miles Gemini, the all-wood airframe was fitted with retractable Fowler wing flaps and the Messenger also had distinctive triple fins and rudders, in order to maintain sufficient directional control down to the exceptionally low stall speed of 25mph. Just as with the Gemini today, the wooden construction, along with a shortage of parts for Blackburn Cirrus engines, means the Messenger is a very rare bird indeed. The all-wood structure is prone to warping in damp conditions, whether stored in a hangar or, as was fated to happen to many, left outside in the immediate post-war days. The Cirrus is very susceptible to shock-cooling — when the throttle is closed too quickly in the descent, it can result in cracked cylinder heads, even more so than the DH Gipsy Major engine on the Tiger Moth and other similar types. Today, fewer than a dozen Messengers remain airworthy, in New Zealand and the UK.

> ***"The wooden construction and a shortage of parts for Cirrus engines means the Messenger is a very rare bird indeed"***

Following an announcement by the Sywell Messenger Trust that after 21 years it was no longer financially able to operate the aircraft, an approach came from brothers Alan and Phil Hardwick, who will continue to base G-AKIN at Sywell. Alan is a private pilot with a passion for vintage aircraft and Phil is a retired air traffic controller. Both attribute much of their enthusiasm to their late father who, after an apprenticeship at the Bristol Aeroplane Company, went on to spend his career with British Aerospace at both its Filton and Stevenage sites. They made a proposal to become the new custodians of the Messenger in his memory, and are now only the fourth owners of the aeroplane. This British classic deserved to carry on flying when so many of its breed have long since been lost. Thanks to them, it will.

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DENIS J. CALVERT

FlightLine

Recollections and reflections — a seasoned reporter's view of aviation history

'Chuck' Yeager's flight of 14 October 1947, when he piloted Bell X-1 46-062 to Mach 1 and beyond, ensured his place in aviation history. In doing so, he demonstrated conclusively there was no 'barrier' associated with the sound barrier. The straight-winged X-1 was followed by the Bell X-2, a completely new design, again rocket-powered but with 40° swept-back wings, this reflecting late-war German thinking into supersonic flight. Once more, Bell Aircraft was on a roll and the flight test programme was hugely successful, USAF test pilot Mel Apt reaching an unofficial record Mach 3.196 on his first and only X-2 flight on 27 September 1956, although he died in the attempt.

Then there was the Douglas X-3 Stiletto, designed to cruise at transonic speeds for 30 minutes or more and to reach Mach 2. With a wingspan of just 22ft and a fuselage 66ft long, this was, without any doubt, the hottest-looking, sleekest, pointiest (there's no better word) aircraft ever, the sort of thing Dan Dare, Pilot of the Future would choose when not otherwise occupied in his day job flying spaceships. Everything about it said 'speed'. Unfortunately for all concerned, its performance never met expectations. It was twin-engined (two Westinghouse J34s) and, unlike the X-1 and X-2, capable of taking off under its own power, but flight-testing revealed the engine thrust was insufficient to reach the design speed, even Mach 1 only being achievable in a dive.

How quickly things change. Bristol 188 XF926 on display at Cosford two years ago — now it's not deemed worthy of space. KEY/BEN DUNNELL

Futuristic designs were not confined to the American aircraft industry. SNCASO in France produced its SO9000 Trident which was, in its Gallic way, just as aggressively pointy as the X-3. Making its first flight on 8 April 1951, the prototype displayed at the 1953 Le Bourget Salon. Designed with a three-barrelled SEPR rocket as its primary powerplant, the Trident also had a podded Marboré turbojet at each wingtip. Unlike the early American 'X-planes', the Trident was conceived against a military requirement for a rocket-powered interceptor capable of taking on enemy bombers at high altitude. Two Trident Is were built, followed by seven improved SO9050 Trident IIs. The Trident II was capable of Mach 1.9 and had an impressive, nay spectacular, rate of climb, but ultimately the Armée de l'Air went for the more conservative and conventional Mirage III as its next interceptor.

> *"Britain had its own research aircraft every bit as impressive"*

Britain had its own research aircraft every bit as impressive as the Trident, in Bristol's 188, although it was a bit later on the scene, only making its first flight on 14 April 1962. With its airframe built of stainless steel, the complexities of which contributed significantly to delays in its construction, the 188 was powered by two wing-mounted DH Gyron Junior turbojets with movable shock cones in the intakes. Designed for prolonged periods of supersonic flight, it was intended to provide input for Avro's 730 supersonic bomber, but this was cancelled at an early stage in the 188's development. Two 188s were built, XF923 and XF926, but various problems with engine surging and afterburner operation limited the test programme's usefulness. The two aircraft made only 70 flights between them, four of which were appearances at the 1962 Farnborough show, and the 188 never achieved anything like the planned 'half-hour at Mach 2'.

Given their significance and continuing public interest, examples of three of the types mentioned have been preserved. Yeager's X-1 *Glamorous Glennis* hangs at the Smithsonian in Washington, the first Trident I is proudly on show at the Musée de l'Air et de l'Espace at Le Bourget, while Bristol 188 XF926 escaped the axe to be preserved by the RAF Museum at Cosford. Sadly, while XF926 used to be displayed in the Test Flight hangar, it was moved out of public view in a reorganisation early in 2023 and now faces a distinctly uncertain future. It truly deserves better.

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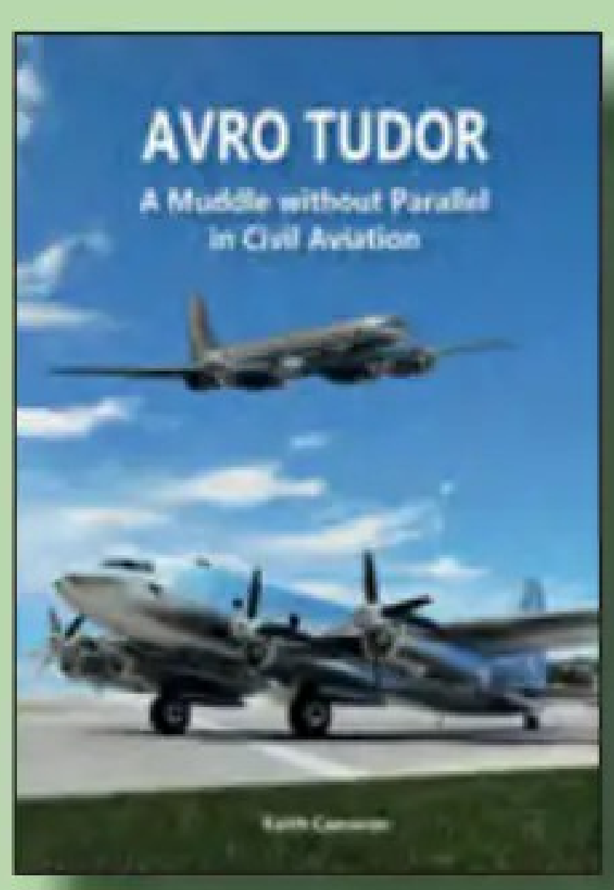

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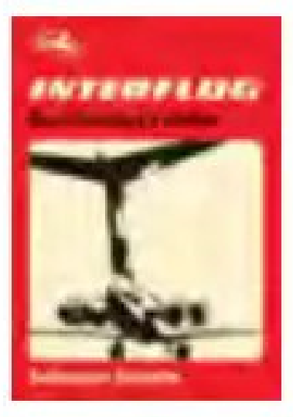
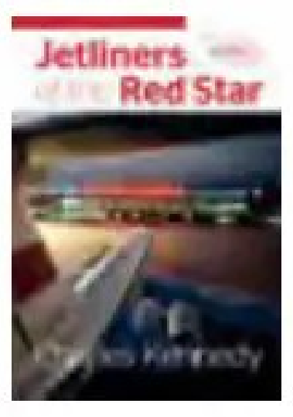
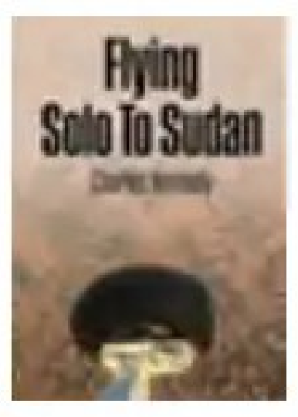
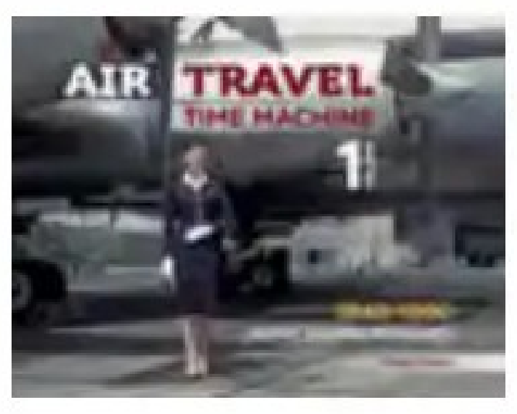







astral HORIZON

From the Cockpit

RICHARD CROCKETT

Join the Shuttleworth Collection's latest pilot on his vintage flying journey

No sooner, almost, had heavier-than-air flight been achieved than air racing started, the very first race being held in 1909 near Paris. It wasn't long before the sport became a widespread spectator event, with pilots from all over the world competing in events such as the Schneider Trophy, the MacRobertson Air Race and, more recently, the Reno National Championship Air Races, while the King's Cup featured the best of British aviators.

Today, Shuttleworth is home to several notable British racing aircraft, among which the Comper Swift stands out. Nicholas Comper started the Comper Aircraft Company in 1929, having recently left the Royal Air Force — during World War One, in the Royal Flying Corps, he flew Royal Aircraft Factory BE2s and RE8s on reconnaissance missions. While still in the RAF, he studied aerodynamics and went on to teach engineering students, including Frank Whittle.

Comper loved air racing and began building racing aeroplanes, and it wasn't long before Richard Shuttleworth joined the board of the company as a director. Of the various aircraft built by the firm, the Comper Swift is perhaps the most notable and best-known. The Swift is a single-seat monoplane, known for its sleek, streamlined design and, in the case of the Shuttleworth Collection's G-ACTF, fitted with a 90hp Pobjoy R radial engine. The airframe itself is tiny, and by comparison, makes a Pitts Special look big. The cockpit is small, and once on board it quickly becomes apparent how poor the forward visibility is. In fact, there really is no forward visibility at all, and you quickly become accustomed to tilting your head from side to side to peer down the side of the fuselage to see where you're going, both on the ground and in the air.

Richard giving his first Comper Swift display during Shuttleworth's season-opener. BEN DUNNELL

> *"You quickly become accustomed to peering down the side of the fuselage to see where you're going"*

From a flying perspective, the Swift is unusual by modern standards. Longitudinal stability is low, and one must exercise caution to not overstress the airframe with excessive elevator movement. Indeed, to climb all that is required is to relax pressure on the stick, which will then let the nose pitch up, necessitating a gentle push to stop the nose from raising too far. Similarly, directional stability is also low, and in general it takes pilots a few moments to understand how to keep the slip ball in the centre using the rudder pedals.

Once you've grasped how to manage the unique handling qualities of the Swift, you can begin to relax and enjoy the aircraft for what it is: a thoroughbred racing aeroplane. Display flying in the Swift is a joy and allows the opportunity to demonstrate the speed and performance of the aircraft to the crowd. Most passes are flown at around 120mph; however, the small size of the airframe gives the impression that it's going much faster.

Landing can be an unusual affair, again due to the aircraft's singular characteristics. It would be easy to find yourself in an unfortunate sequence of oscillations just above the ground, so care must be taken to be gentle on the stick while presenting the machine in the correct attitude in order to touch down gently.

While flying a Swift does need to be approached with due care and attention, it remains a legendary aircraft from the golden age of aviation, celebrated for its elegance, its engineering, and the adventurous spirit it embodied. It will bring a large smile to the face of anyone lucky enough to try one.

1957 PERCIVAL P56 PROVOST T1

For Sale

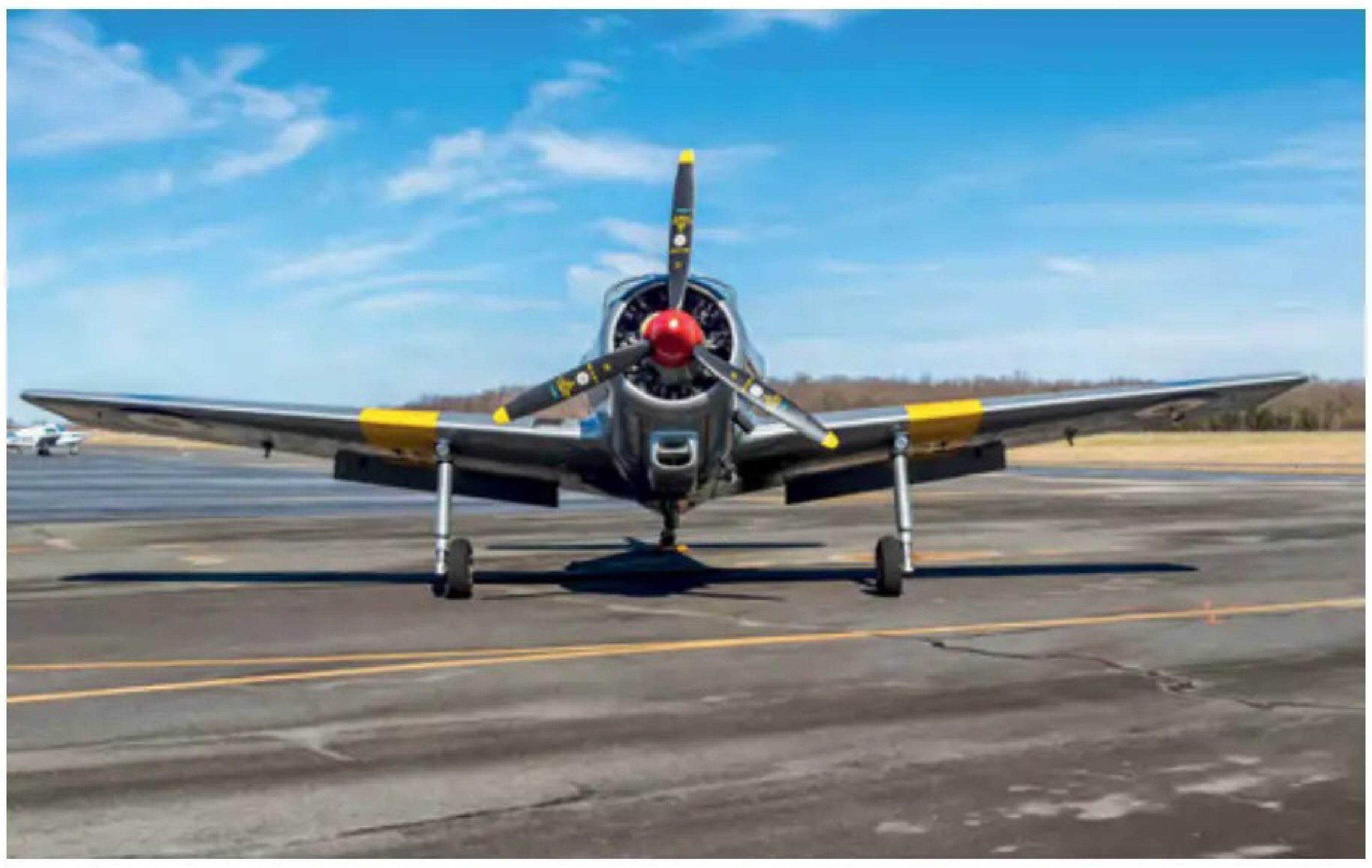
Pelican Aircraft Consulting presents a unique opportunity to own one of the rarest warbirds in existence and the absolute finest flying example in the world today.

Designed as a primary trainer for the RAF, the Percival Provost served with distinction in many RAF Flying Training Schools and was exported all over the world serving the Air Forces of Irag, Burma and Oman, just to name a few. Entering service in 1953, the airplane trained hundreds of RAF pilots that would eventually transition to the Vampire and other aircraft. Paired with the reliable Alvis-Leonides engine, the airplane made an outstaying primary trainer. The Provost provided a stable platform for instrument work and is impeccably balanced in roll and pitch. This fully aerobatic airplane is a delight to fly and will make you the envy of all of your flying friends.

This particular Provost began its journey back into the air in 1991. The owner, having flown the Provost in the RAF, wanted to create an authentic and detailed restoration. He found the last airframe produced and teamed up with a world-class restoration shop, Kampel Enterprises, to bring this amazing airplane back to life. No expense was spared to restore this Provost to as close to the original configuration as when it rolled off of the assembly line at the Luton Airport. The culmination of the restoration included the airplane winning Reserve Grand Champion Warbird in 1998 at the EAA AirVenture at Oshkosh.

Since the restoration was completed, the airplane has been flown and meticulously maintained by the owner. Each year, one of the original craftsmen that worked on the restoration completes and extensive annual.

This unique airplane is offered with an airframe/engine/propeller spares package too extensive to list here. The spares even include a complete engine currently in the process of restoration by the legendary Paul Sharman at Vintech, UK. There are plenty of accessories, parts, engineering drawings and other items to keep this amazing airplane flying for decades to come.



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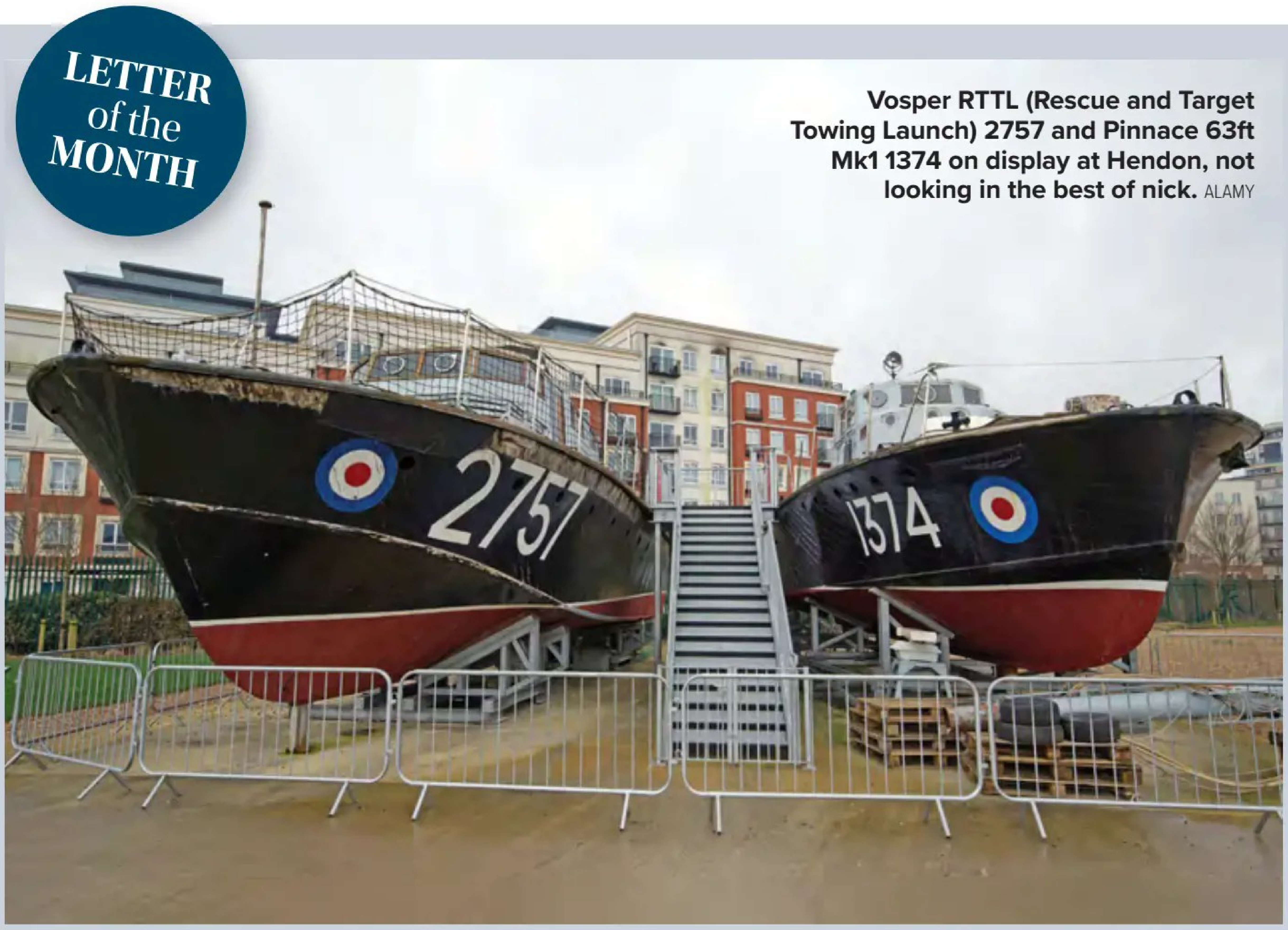
In every issue, the writer of our Letter of the Month wins a **£25 book voucher** to spend with leading military and transport publisher Crécy.

LETTER of the MONTH



Vosper RTTL (Rescue and Target Towing Launch) 2757 and Pinnace 63ft Mk1 1374 on display at Hendon, not looking in the best of nick. ALAMY

I read your article on the Beverley in the latest edition of *Aeroplane*. I recall the scrapping of the Hendon example, have made a very small contribution to the Solway appeal and I wish them every success in preservation of the last survivor. On a smaller matter, related to lack of maintenance of key exhibits at the RAF Museum, can I point to the two wooden-hulled post-World War Two RAF high-speed launches which sit uncovered and forlorn outside, slowly deteriorating?

Periodically renovations are carried out — I suspect by volunteers — and a few years ago steps were provided to provide deck-level viewing. Not exactly accessible for all, but a step forward. However, on a recent visit, I noted that the steps were barricaded, and that the vessels had visibly deteriorated. A query to the museum suggested little priority for these items. There was no mention of the ultimate ownership of these exhibits.

Ironically, there is a seaplane tender under cover in what is now Hangar 1, the former Battle of Britain Hall, and the main entrance. Bizarrely, in my view, it is not positioned contextually anywhere near the Sunderland in the same building, nor the Coastal Command exhibits in the historic hangars, but at least it is indoors.

If, like the Beverley, it is not a priority — nor even a liability — for the RAFM to properly protect and conserve the launches currently stored outside, the museum is currently very active with its disposal policies, so perhaps a good home could be sought for these vessels before they end up as firewood? Rain through the deck and drying hulls out of water is not a good combination. Hendon is not near a major body of water, if one discounts the Welsh Harp Reservoir, and Cosford is in the centre of the country. Maybe there is a venue with a joint nautical/aviation purpose that might be interested?

John Usher

Incidentally, there was a caption error relating to the Beverley piece last month. The picture on page 10 shows not the destruction of XH124 at Hendon, but the more carefully dismantled XB259 at Beverley before it went to Fort Paull — Ed.

I greatly enjoyed your article about the IGN B-17 Flying Fortresses in the May issue. One thing that was not mentioned was that several of them participated in an episode of the Granada TV series *A Family at War*, namely series three, episode 12 called 'Breaking Point', which was broadcast on 22 December 1971. The B-17s portrayed RAF-operated examples using self-adhesive vinyl markings and Creil stood in for an RAF station. The episode can be viewed on YouTube.

Aeroplane readers may also be interested to know that series three, episode one of *A Family at War*, 'The Lucky Ones' features Lancaster NX611 when it was with the Reflectaire museum at Blackpool in 1971. That episode is on the same YouTube channel as 'Breaking Point' and was originally broadcast on 6 October 1971.

Colin Barron

I am becoming increasingly concerned about the future of the aviation history residing in individuals' private archives once the owner is no longer around. The 'obvious choice' national collections have all shown little or no interest when offered such material as a gift, which I simply do not understand.

In my own case I have spent many decades taking more than 30,000 aviation photographs, interviewing in excess of 300 veterans, and copying their collections of photos, documents and other memorabilia. While much of this material has made it into print in my books, the total used in this way hardly scratches the surface of what I have gathered — so, what does the future hold for the vast quantity of material which has yet to see the light of day? With no interested family members to take it on, will this history end up in house clearance, charity shops or the local tip?

I am sure I am not alone in expressing this concern and would be interested to hear of other people's experiences with any helpful suggestions for a way forward.

Dr Steve Bond

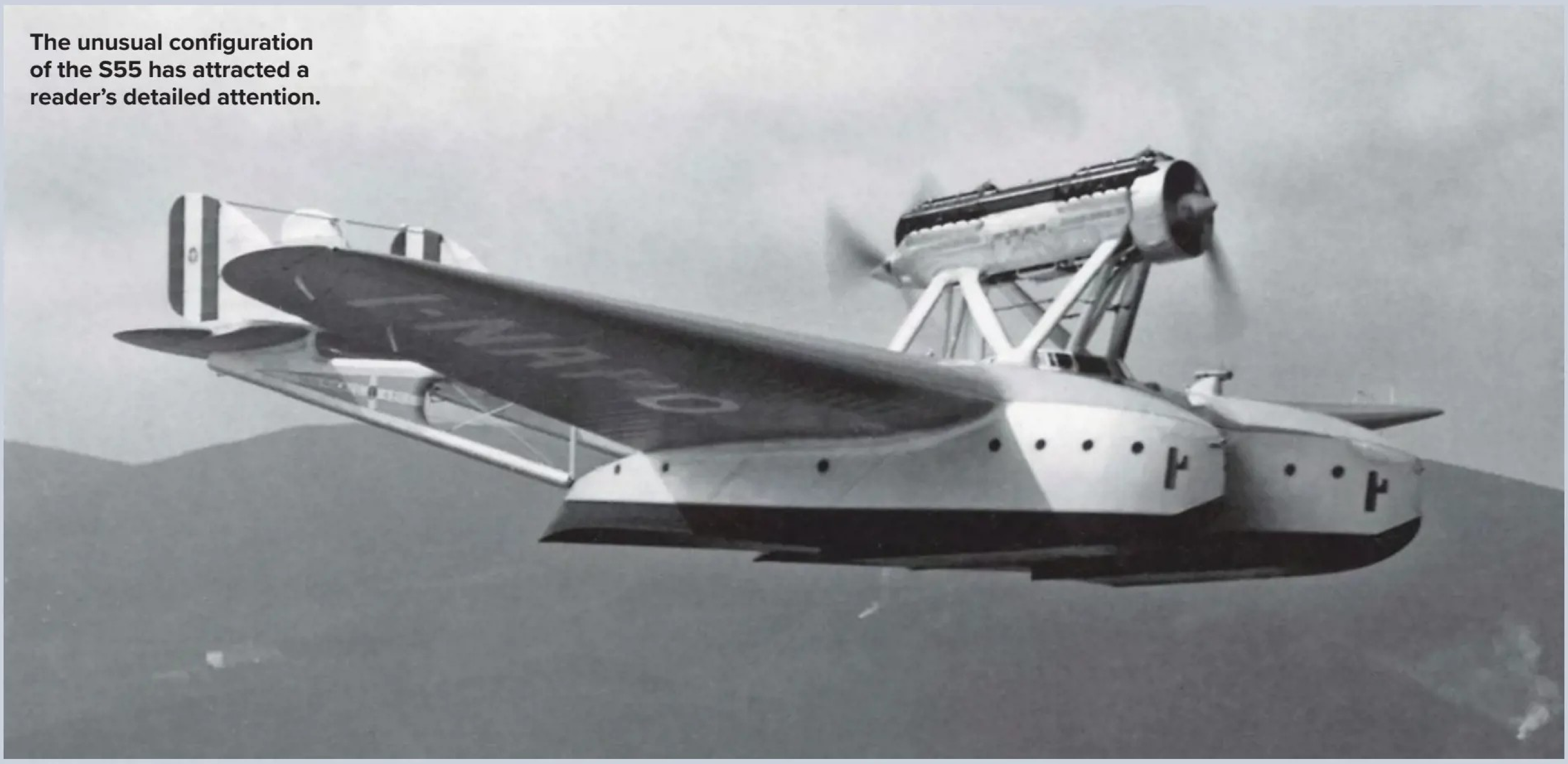
As usual, I found the May issue a real goldmine, particularly Jean-Christophe Carbonel's excellent piece about the IGN B-17s. It is the best article I have ever read on the subject, except for one little thing. Monsieur Carbonel says William P. 'Bill' Odom was hired to ferry the aircraft to France, which is probably very true, but I do not think he would have flown these four aircraft "single-handed", thus breaking a "few safety regulations even in 1947". As an experienced transport pilot in the China-Burma-India theatre, I believe Mr Odom organised the flights, but would have been accompanied by a crew. On the other hand, everyone knows an experienced pilot could fly a specially equipped B-17 solo, such as Paul Mantz did in his celebrated B-17 belly-landing for the classic film *Twelve O'Clock High*!

Bill Odom did, of course, become famous for other long-distance solo flights. It was in 1949 that he made two FAI-recognised record flights: in January from Honolulu to Oakland, California, and then in March from Honolulu to Teterboro in Beechcraft Bonanza N80040 *Waikiki Beach*. But 1949 marked also his death, in the terrible crash of Jacqueline Cochran's P-51C racer *Beguine* during the Cleveland National Air Races.

Randall Volpe

The editor reserves the right to edit all letters. Please include your full name and address in correspondence.

Bill Odom in another multi-engined machine: A-26 Invader *Reynolds Bombshell*, which he flew solo around the world during 1947.



The unusual configuration of the S55 has attracted a reader's detailed attention.

Thank you for the interesting Database feature on the SIAI S55 twin-hulled flying boat (*Aeroplane* March 2024). It had an intriguing configuration and, apart from the twin hulls and the open cockpit embedded in the wing, one feature that stood out for me was the large upward tilt of the two engines. I wondered why the thrust line was tilted up so much. From the wing setting angle mentioned in the article, and after some fun with a ruler and protractor, I estimate that the thrust line was tilted up by at least 7° from the aircraft datum.

Several possible reasons spring to mind for SIAI designing the S55 like this: to keep the front propeller clear of water spray; to keep the propeller slipstream above the pilots' heads; to create a lift vector equal to about 12 per cent thrust to assist take-off; to reduce pitching moment changes when moving the throttle by reducing the moment arm (by about 15 per cent, based on 7°). The thrust line was fairly well-aligned with the horizontal tailplane, perhaps enabling the use of a smaller tail, and it looks quite well-aligned with the upper surface of the wing, which would enhance wing lift.

A 7° tilt angle would give a negligible loss of forward thrust (less than 1 per cent), and the only down-side of this setting angle appears to be the need for a smaller diameter for the rear propeller to create an acceptable tip clearance. As a result of the smaller diameter, the S55's rear propellers had four blades rather than two, so there would have been a small loss of efficiency and a weight penalty. However, the tilt kept the rear engine mounting struts short, keeping weight down.

Although the tilt angle looked a bit extreme to me, it now seems like a very good choice, unless I have overlooked some downsides. Perhaps other readers have spotted some.

Nigel Scrase

Q&A

COMPILER: BARRY WHEELER

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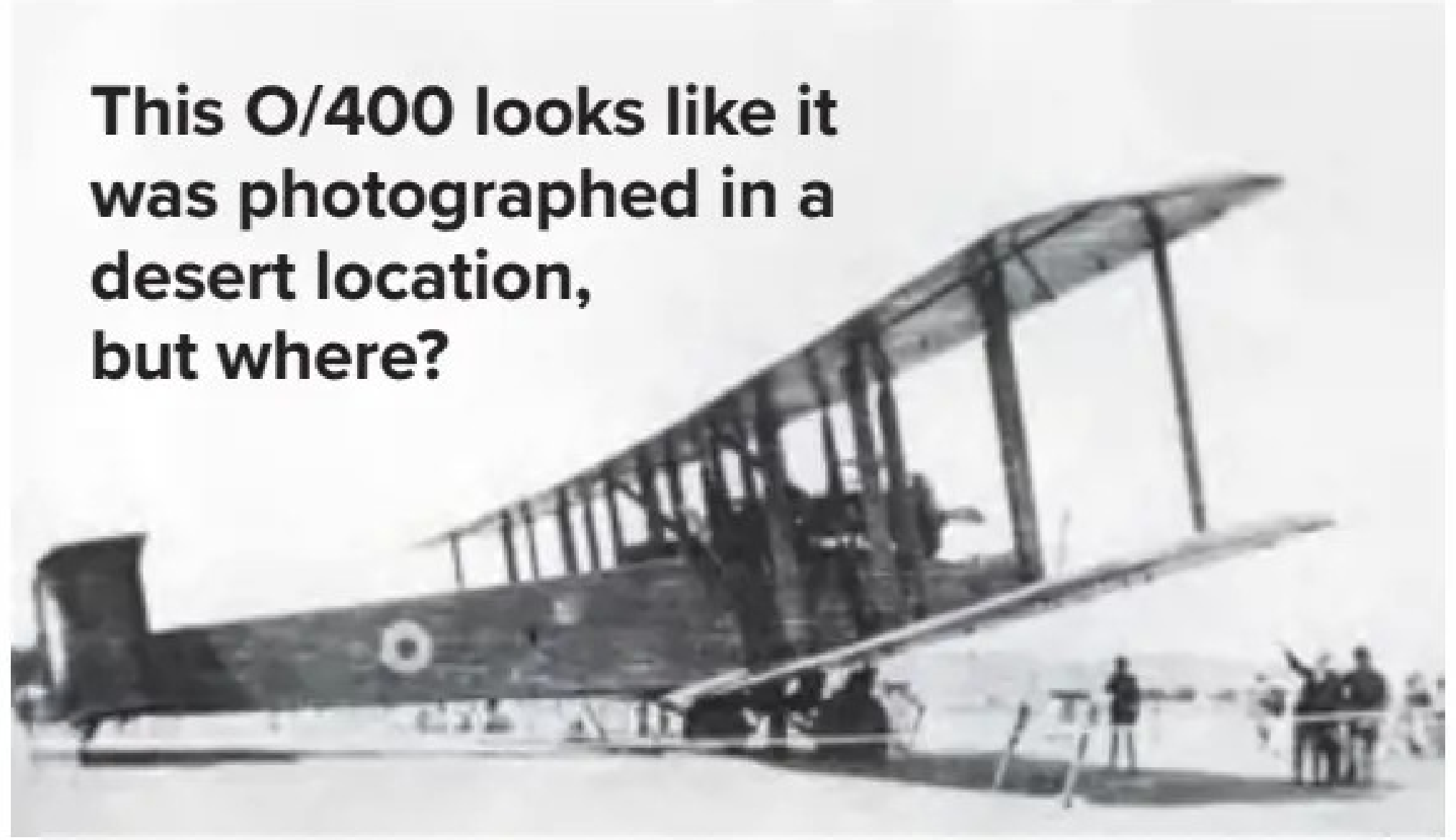
E-MAIL TO: aeroplane@keypublishing.com,
putting 'Q&A' in the header

Are you seeking the answer to a thorny aviation question, or trying to trace an old aviation friend? Our 'questions and answers' page might help

THIS MONTH'S QUESTIONS

Mystery O/400

Q Ross Denton was sorting out some of his father's files and came across this view of an anonymous biplane. His father recalls he bought the print at a second-hand market around 1980 and wondered whether the type was a Vickers Vimy — if so, he asked, was it involved in the transfer of troops of the Northamptonshire Regiment to counter a threat in Iraq in the 1920s? The type is actually a Handley-Page O/400, but no identifying marks are visible. Could a reader, perhaps in possession of a sharper copy, add some details as to its identity and whereabouts?



This O/400 looks like it was photographed in a desert location, but where?

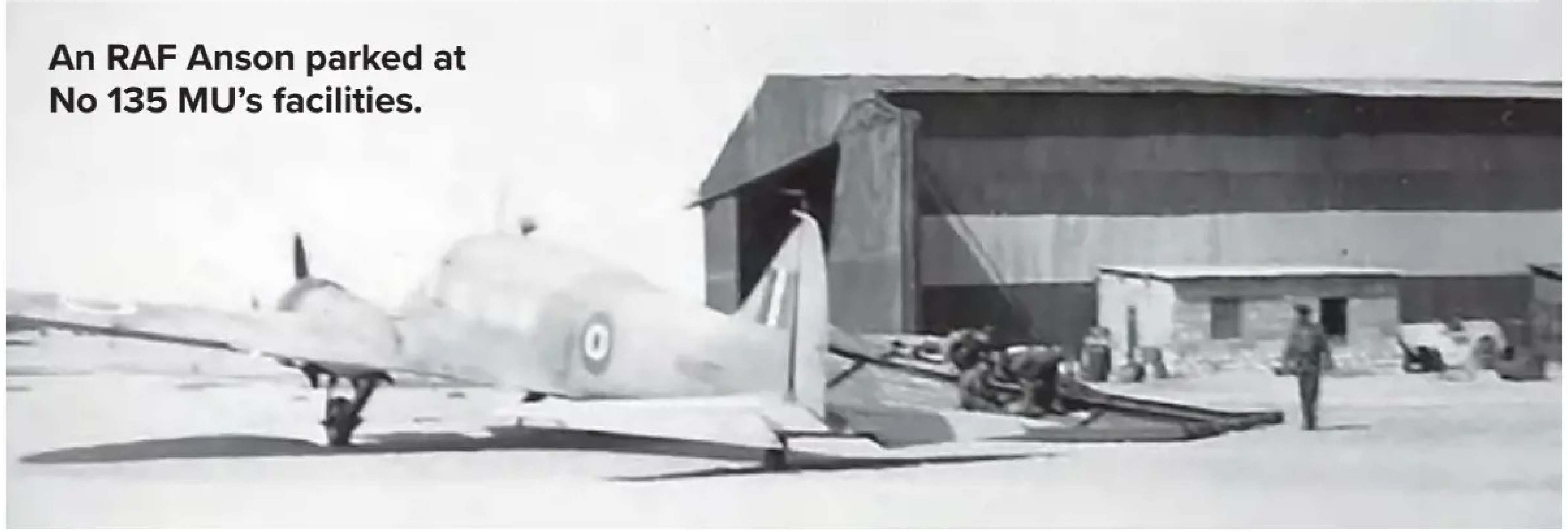
Anglesey archive

Q A former Tornado pilot and native of Anglesey, Hywel Evans, is establishing the Aviation on Anglesey Archive to record the history of aeronautics on the island. The initial coverage now available on valleyaviationsociety.co.uk/news involves the 1940-50s period, with further releases for subsequent years on a monthly basis. Hywel is seeking more information to enlarge the archive to take in anything relating to the subject, typically movements, logbook records and memorabilia involving the RAF stations at Bodorgan, Mona and Valley and the Saro facility at Beaumaris. If readers can help in any way to achieve these aims, contact Hywel by e-mail to taffevans@icloud.com.

Gnat XP541 of No 4 FTS was a Valley resident in the 1970s.

North African relics

Q Charles Harding is curious to know if any photographs exist that show the huge Allied stock of withdrawn military aircraft that apparently existed in North Africa following the German defeat in World War Two. Having just read Humphrey Wynn's book *Wings Without Weapons* published in 2008, Charles says Wynn comments that his No 2 Aircraft Delivery Unit was based at landing ground LG237 near Cairo West and had as its neighbour No 135 Maintenance Unit, "which was a large stores park whose huge stock of aircraft — some of which we test-flew or delivered from time to time — were parked out in the open in unending rows in the desert sands, most of them destined never to fly again..." While there are plentiful views of derelict Luftwaffe wrecks, Charles says there must be pictures of this sizeable graveyard in wartime files, and a suitable photo would be welcome.



An RAF Anson parked at No 135 MU's facilities.

THIS MONTH'S ANSWERS

'Greif' unknown

Q The May edition published a request from Marc Lecocq in Belgium, asking if anyone could identify the individual main undercarriage leg of a Heinkel He 177 which washed up on the beach at Ostend in 1975. Reliable details would be added to the information board for this rare wartime item currently held by the Brussels Royal Army Museum.

A Ian White suggests the former 'owner' could be a He 177 A-3 of 2./KG 40, shot down at 04.29hrs on 22 January 1944 by an RAF Mosquito of No 85 Squadron flown by Fg Off Newell and radar operator Flt Sgt Randall. The Heinkel, Werknummer 332231, coded 5J+ZL, went into the sea some six miles south-east of Hastings with the loss of Oberfw Alfred Billing (body washed ashore on 25 January and buried at Folkestone) and Fw Hitschfeld (body washed ashore at Lydd, also buried at Folkestone). Fw Heinrich Beitter and Oberfw Franz Andrae bailed out, becoming PoWs, while gunners Oberfw Hoffman and Uffz Schlagkamp — named in another source as Josef Stanjewski and Alfred Morbitzer — were posted as missing.

Jeremy Downs offers another suggestion: He 177 A-3 Werknummer 535741 of 1./KG 40, code CJ+FO, which was lost without trace in the sea on the same night, 21-22 January 1944. The crew comprised pilot Oberleutnant Helmut Botterbrodt, observer Stabsfeldwebel Otto Schelldorfer, wireless operator Fw Wilhelm von Trott zur Solz, engineer Fw Hans Streller, and gunners Unteroffiziers Herbert Schulze and Jacob Koch. Jeremy adds that other He 177s lost around that January period appear to be accounted for on land.

Tornado symposium participants

Q In the May issue, Gordon Bartley asked if anyone could provide a list of official attendees at the International Tornado Symposium staged at RAF Cottesmore in October 1988.

A Dr Steve Bond, who was at the event, responded with details of the units concerned. From the UK, the TTTE, Nos 2, 5, 9, 11, 14, 15, 16, 25, 29 and 31 Squadrons, No 229 OCU, the Strike Attack Operational Evaluation Unit and the ETPS; from West Germany, the Luftwaffe's JBG 33 and the Marineflieger's MFG 1 and MFG 2; and from Italy's Aeronautica Militare the 6° and 36° Stormo.

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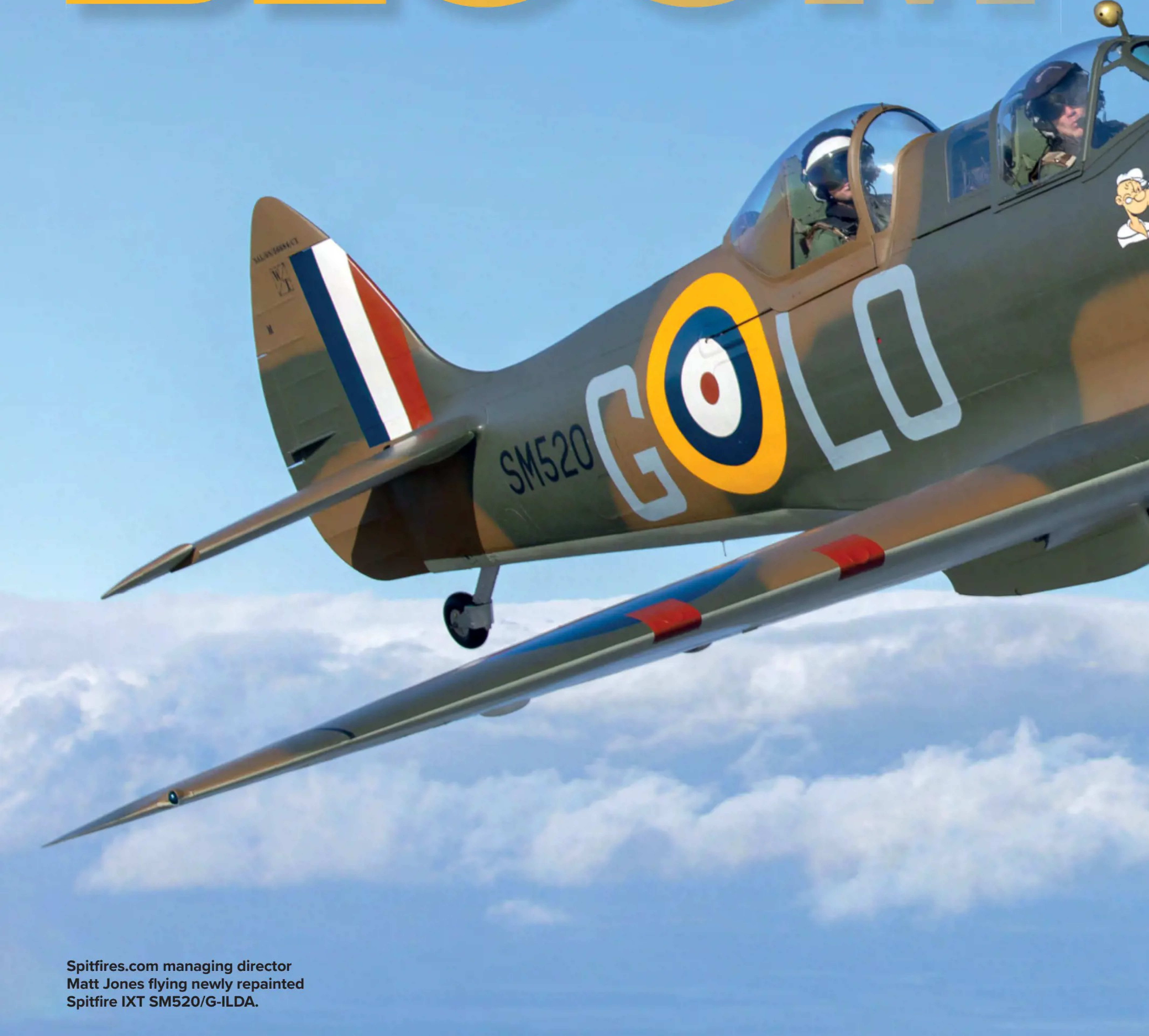
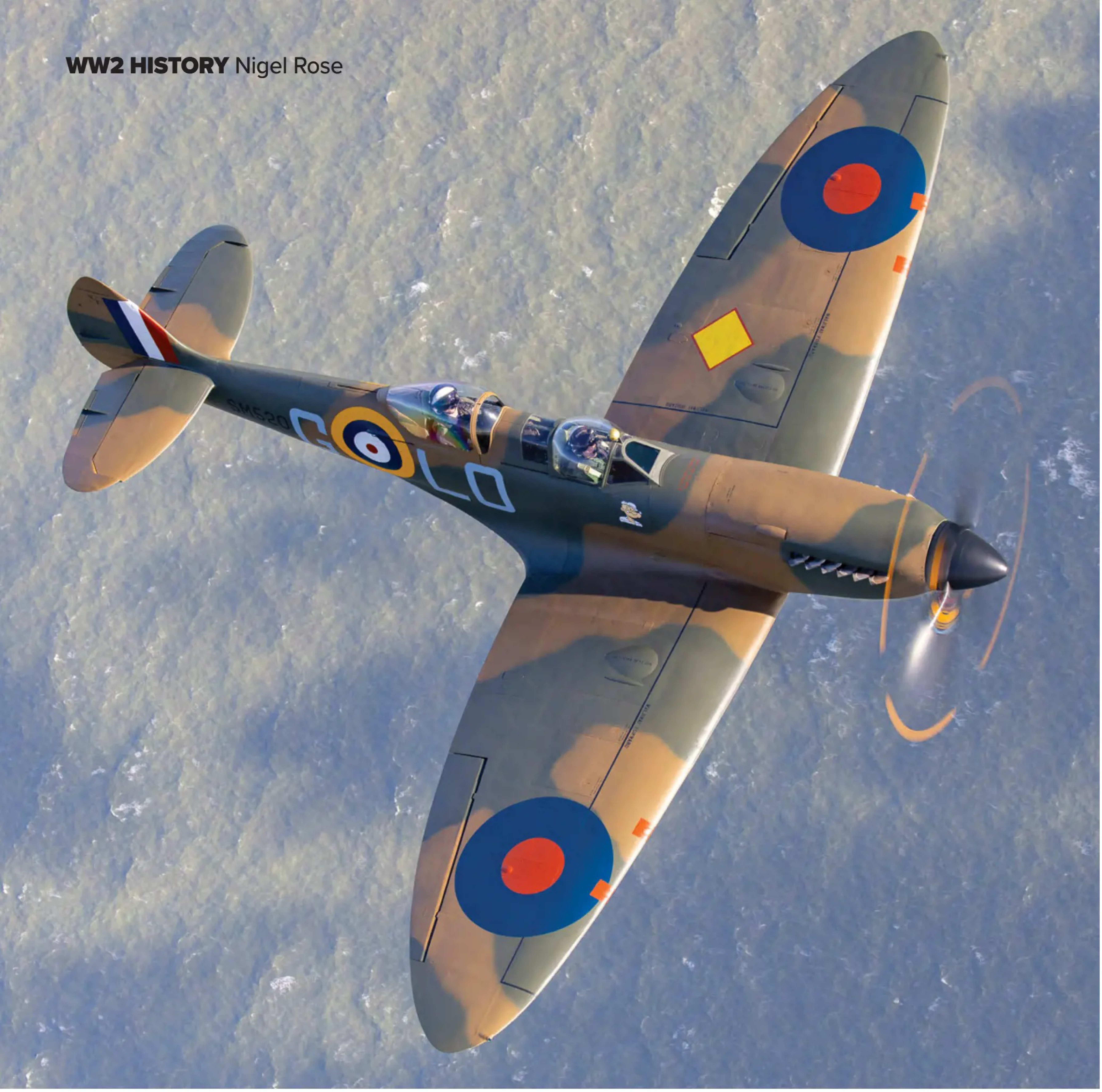


Spitfires.com managing director Matt Jones flying newly repainted Spitfire IXT SM520/G-ILDA.

Nigel Rose was, in many ways, no ordinary fighter pilot, but being thrust straight into the Battle of Britain kick-started an illustrious RAF career — and now tribute is paid by an airworthy Spitfire you can fly in

WORDS: BEN DUNNELL **AIR-TO-AIR PHOTOGRAPHY:** DARREN HARBAR

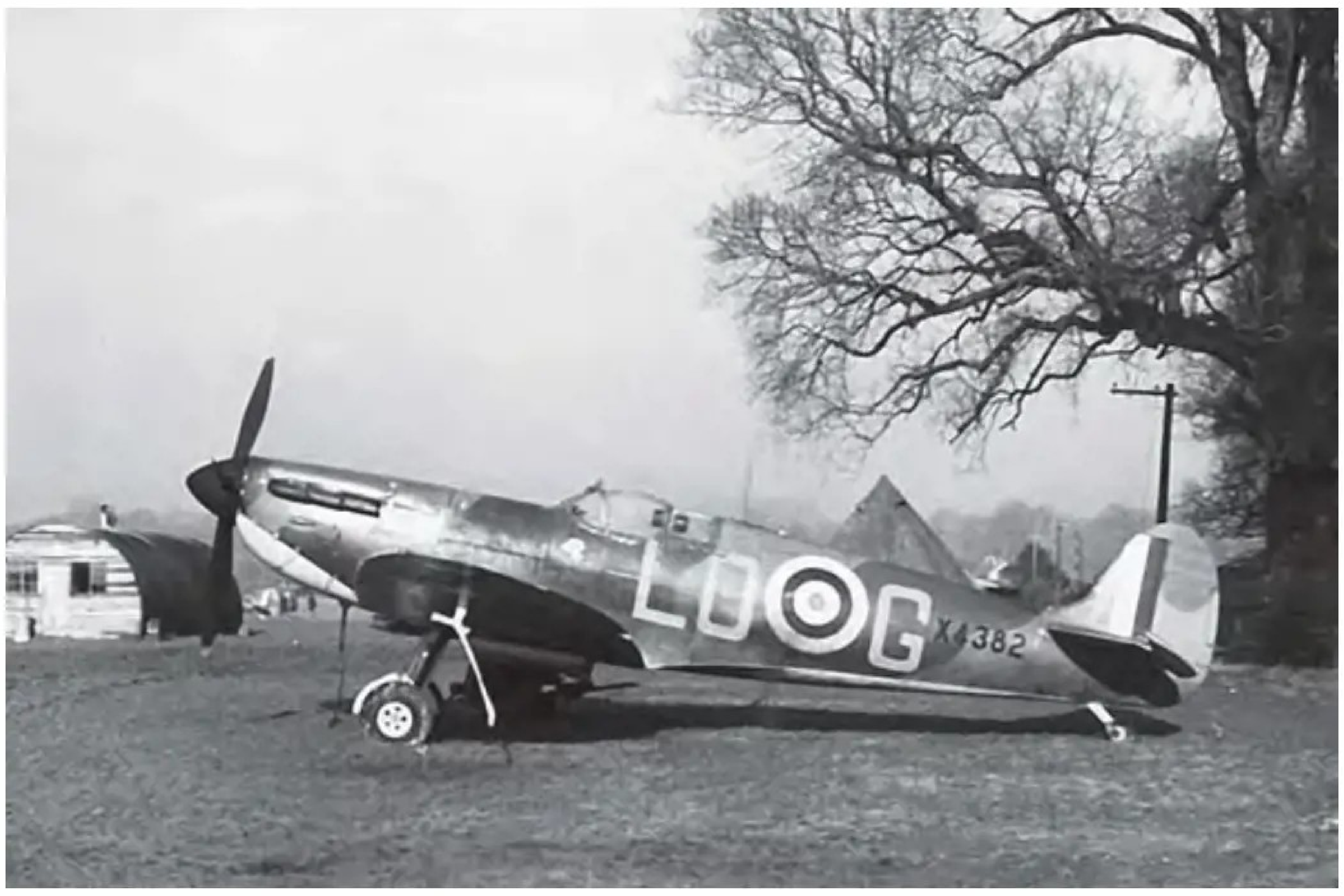


ABOVE: Spitfire SM520, built in 1944 as a single-seat MkIX, delivered to the South African Air Force and later restored as a two-seat IXT before its 2009 purchase by what was then the Boultbee Flight Academy, was felt in need of a repaint. The decision was taken to replace its No 4 Squadron, SAAF markings with those of a Westhampnett-based fighter, and X4382 fitted the bill.

It was a Spitfire pilot who gave Freddie March, Duke of Richmond and Gordon, the idea: turn the perimeter roads of RAF Westhampnett, established on the March estate near Chichester, into a racing circuit. Tony Gaze knew the place well. The Australian had first flown from Westhampnett with No 610 Squadron, part of the Tangmere Wing, during 1941. Come the war's end, with 12-and-a-half enemy aircraft shot down as well as a DFC and two bars, Gaze saw in the redundant aerodrome new possibilities. Just before hostilities, newly arrived in Britain to study natural sciences at Cambridge, he had competed in a club meeting at Brooklands. Now he realised how the Sussex airfield could provide a successor to the Surrey track, and the Duke, himself a pre-war Brooklands racer, was all ears. When the Goodwood Motor Circuit staged its inaugural event in September 1948, Gaze wasn't on any of the grids — his return to European racing came a little later — but his influence had been instrumental.

Makeshift the venue may still have been, but for enthusiasts the country over, the resumption of professionally organised competition after such a long break came as a delight. The likes of Gerald Rose, for example, must have rejoiced. Back in 1909, his book *A Record of Motor Racing* became the first significant history of the sport to be published in Britain, chronicling in tremendous depth its formative years. So valuable a reference tome was Rose's work that it was the subject of a 40th anniversary reprint. By then, Goodwood had become a recognised fixture in the motor racing firmament. But while it belonged to an era far removed from that documented by Rose, the new circuit had a close link with the pioneering historian, for his youngest son had been another of the Spitfire pilots who forged Westhampnett's wartime legend, and with it a bond that endures to this day.

From the airfield encircled by the fast, challenging Goodwood track, so splendidly resurrected for



LEFT:
The time he spent flying No 602 Squadron Spitfires from Westhampnett proved a formative period in Nigel Rose's career.
VIA MARK HILLIER

BELOW LEFT:
Nigel Rose was commissioned into the RAF just over six months after being called up as an RAF Volunteer Reserve member.

BELOW RIGHT:
A late-production Spitfire I, X4382 is documented as having been flown by eight pilots on No 602 Squadron. When 602 left Westhampnett for Scotland, the aeroplane was left behind for No 610 Squadron, another Royal Auxiliary Air Force outfit. Following periods with several other units, including 808 and 880 Squadrons of the Fleet Air Arm, X4382 was struck off charge on 26 January 1945.
CROWN COPYRIGHT

the first Revival meeting in 1998, a Spitfire can again be seen flying with the codes of No 602 Squadron, as stationed at Westhampnett when the Battle of Britain was at its height. Specifically, it depicts MkI X4382/LO-G, the aeroplane flown five times during that period by Plt Off Nigel Rose, son of Gerald. The repaint of Spitfires.com's best-known example, two-seat Spitfire IXT SM520/G-ILDA, thus tells a story close to home.

◆

Stuart Nigel Rose had been born in Newcastle-upon-Tyne on 21 June 1918. The family moved around quite a bit: his engineer father was at that time working on submarines at the Elswick shipyard, while young Nigel went on to be educated in Weston-super-Mare and later Essex. He embarked on an engineering degree at London University, but decided to change course and train as a quantity surveyor, while also joining the RAF Volunteer Reserve in December 1938. Undergoing instruction with No 3 Elementary and Reserve Flying Training School at Hamble, he had 87 flying hours in his logbook when war broke out the following September, and he was called up.

In sending pilots to the front line, time was now of the essence. Come February 1940, Nigel went to No 14 Service Flying Training School, initially at Kinloss before a move to Cranfield. He was commissioned on 18 June and almost immediately posted to No 602 (City of Glasgow) Squadron, Royal Auxiliary Air Force. At this stage, 602 was stationed at Drem, east of Edinburgh, combating fairly regular Luftwaffe raids against targets in that part of Scotland. The operations record book shows the newcomer's first mission to have been an uneventful patrol in L1040, one of the unit's older Spitfire Is, on 15 July.

But then came word of a transfer southwards, and 13 August duly saw 16 Spitfires flying down to 602's new home at Westhampnett, via a fuel stop at Church Fenton. Such was the intensity of the aerial fighting over the south-east of England that No

ABOVE: A Popeye caricature was painted on X4382's port side, and replicated when SM520 took on its new look.

11 Group was "anxious" to bolster its forces as rapidly as possible, but although a "large battle was in progress at the time of landing", 602 could not join in, "as they were not on the correct R/T frequency."

Nigel began to take in his new surroundings. Westhampnett, he wrote later, "was unpretentious, with no runways, hangars or other permanent buildings. There was a handful of Nissen huts and a small flint-walled cottage in one corner. Catching the eye was the splendid spire of Chichester Cathedral about two miles in the west… I wrote to my parents on 14 August — 'we live for the moment in a typical Sussex Rectory with a delightful smell of soap, flowers and new mown grass. There are also wasps in abundance of which we bagged two 'certains' and three 'unconfirmed' at tea just after we arrived.'"

It sounds almost idyllic. "The fine summer of 1940 made for days that seemed so long", he added. "The morning call to 'flights' could be as early as 4am and sometimes a scramble would mean taking off in a blanket of mist, above which the only point of reference was the spire of the cathedral bathed pink in the rising sun". But, rapidly, the realities set in.

> ***"I got a lot of rounds off into the back of the Bf 110 as I saw it"***

"After only a day or two, we ourselves began to see casualties in both pilots and aircraft. [Hector] McClean and [Dunlop] Urie were seriously wounded and after a particularly violent engagement it was not unusual to see one or more of our Spitfires limping back with crippling damage. Some could be repaired on site or at Tangmere, but often they would be transported to a maintenance unit for reconstruction, or writing-off."

As for Rose himself, he told the author in 2010, "My first encounter was on about 17 or 18 August 1940… We'd only been there two or three days when we went out to meet a huge gaggle coming in to the South Coast, more or less in the direction of Bognor or Brighton. Our sector commander handled matters very well, and he got us up to about 2,000ft above the incoming bombers and fighters. What's more, he got us with our backs to the sun, which was also a good thing. So there we were at about 22,000 and the Germans were coming in at about 20,000. I'd never seen a German aeroplane before. To see 100-and-something, a mixture of bombers and fighters, silhouetted against a white cloud which was at about 5,000ft like a huge number of little black dots…

"At any rate, the squadron commander said, 'A Flight, you pick the fighter-bombers', the Bf 110s. The other flight, B, was sent to go after the bombers. We in A Flight thought B Flight was rather lucky in that. We chased down, and I can remember reckoning that perhaps the best thing to do was to go for the easiest target, which would be the rear bloke who was tailing along, probably with a rather old aircraft, such as many of us had — we had Spitfire Is, which were getting a bit decrepit.

"I got a lot of rounds off into the back of the 110 as I saw it, but I think I was rather out of range most of the time. We had a gun camera on board, and it showed that the aircraft was rather further out than it ought to have been. The chap turned over on his back and went vertically downwards, white smoke pouring out of one of the engines. I thought 'Ah-ha', you know, 'I've done it!' But I'm afraid experience taught me later that I'd have been very lucky to have done any serious damage. I might have got something through his radiator, because that would have produced white smoke with the glycol streaming out, in which case it was possible he couldn't have crossed the Channel on his way home. Afterwards I thought that probably he'd dived down to that cloud below, disappeared into it, and went on his way home."

His first kill was claimed in Spitfire L1040 on the early evening of 25 August, the combat report outlining how some 200-300 Do 17s, Bf 109s and Bf 110s were encountered at 15,000ft over Dorchester. The squadron record describes them as "a solid mass of enemy aircraft". Again Nigel went for the Bf 110s, attacking two "without observing damage", but then going after a third, "crossing from left to right in front and above". After a six-second burst, the Messerschmitt broke away and down, once more emitting white smoke. However, on this occasion, Rose witnessed the explosion when his quarry hit the ground.

A half-share in another Bf 110 added to his tally on the 7th, and there were other encounters. "In early September", he recounted to the author, "a section was sent up because a reconnaissance 110 had been spotted over Portsmouth. The navy had been firing at it and hadn't had any success. We went up to intercept it, which we did. I had two experienced blokes in the section with me — I was the junior — and we met this chap at about 20,000ft above Portsmouth. We all went into a terrific helter-skelter dive, because this Luftwaffe chap was heading for home and getting down as near to the sea as he could.

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"The first of our section went in as we were nearing sea level and set one of the engines on fire on the 110, and I went in second. I wrote laconically in my logbook, 'No results from self'. But then the third one went in, and the thing blew up and fell in the sea. I always felt they should have handed me a third, because I might have done some damage! But it wasn't confirmed by me."

Eight of 602's Spitfires were sent up mid-afternoon on 11 September, operating together with Hurricanes of No 213 Squadron. As was often the case, 602 was tasked with combating Luftwaffe fighters, while 213 would deal with the bombers. The Spitfires were at 19,000ft above Selsey Bill when an estimated 20-30 Do 17s and the same number of Bf 110 escorts appeared, several thousand feet lower. Behind them, it turned out, were 25-30 Bf 109s, which were "not immediately seen". Rose was flying as Red 3 in L1027, and, the combat report says, broke away from the Spitfire formation to attack a Bf 110 before his squadron leader did so. In fact, Red section went home empty-handed, while Nigel sustained an elbow wound in the course of the engagement and spent the next few weeks recuperating.

While he was grounded, Spitfire X4382 was entering combat. Built at Supermarine's Eastleigh works, its maiden flight took place on 6 September, and delivery to No 602 Squadron just four days after that. Fg Off 'Mickey' Mount was in the cockpit for the machine's operational baptism on 11 September, following which X4382 was flown most by Plt Off Osgood 'Pedro' Hanbury, a former Lysander pilot. He was at its controls on the 15th when he notched up his first confirmed victory, over a Bf 110, and again in sharing a Ju 88 kill on the 21st, destroying a Ju 88 on the 30th and damaging another on 5 October.

It took until 7 October for Nigel Rose to return to flying duties. He added X4382 to his logbook with a patrol on the 10th and completed five missions in the machine, though more often he flew R6780, not least on 29 October when he claimed a Bf 109 as a probable. "After the

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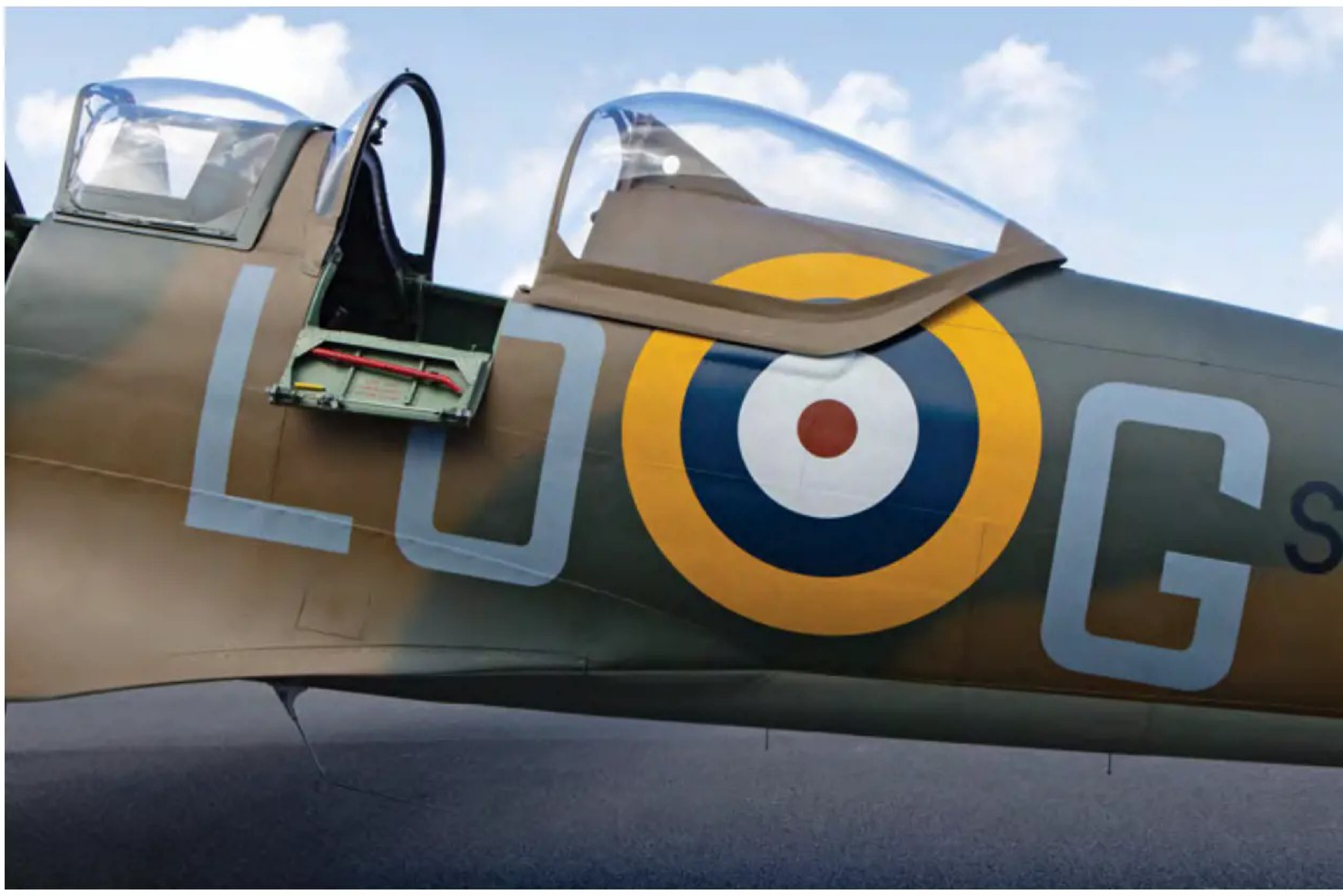
BELOW LEFT: Nigel Rose during the Battle of Britain 70th anniversary commemorations in 2010. ALAMY

BELOW: Code letters LO-G had been worn by Spitfire I L1019 before it ditched on 18 August 1940, following a combat with Ju 87s. Delivered a few weeks later, X4382 took up the identity. DARREN HARBAR



ABOVE: SM520 is available for Spitfires.com's passenger rides in 2024, operating from numerous locations around the British Isles as well as its Goodwood home base. So, if you want to sample the closest thing to Nigel Rose's Battle of Britain experience by looking out over the early-war brown and green camouflage scheme and taking off from the grass runway at Goodwood for a sortie to the white cliffs, now you can.

end of September", he wrote, "the mass raids over West Sussex began to drop off and we were more often than not vectored onto incidents over East Sussex and Kent, but we were still flying an average of three to four sorties a day when the weather allowed."

And even while the battle raged, there had been a little time for relaxation. "In the evening", wrote Nigel, "you could drink in the mess or at the local pubs, but with early starts, heavy partying was not really an option. The squash club in Chichester made us honorary members and this provided a much-appreciated diversion. Here I met Pamela, whom I was to marry the following year."

He went with No 602 Squadron when it returned to Scotland in December 1940, to rest and regroup. Rose's subsequent posting to the Hornchurch-based No 54 Squadron was brief, lasting only from September-November 1941, when he became tour-expired. Assignments as an instructor to No 57 Operational Training Unit at Hawarden and Eshott, Nos 15 and 14 Armament Practice Camps at Peterhead and Ayr, and the Advanced Bombing and Gunnery School at El Ballah, Egypt, occupied the majority of his remaining war. On leaving the RAF in February 1946, Nigel had reached the rank of squadron leader, and resumed his pre-war career.

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Mark Hillier, the operations director of Spitfires.com, sums him up perfectly. "Quiet, softly spoken, but with a sense of charming certainty and determination, Nigel Rose was not what you imagine an archetypal fighter pilot to be like, maybe? He was such an interesting man to chat with and became a regular visitor to Spitfires.com over the years. He was quintessentially a true British gentleman and you warmed to him immediately. In later life he became a chartered surveyor and his manner would have filled any client with confidence.

"It was clear that like all the pilots, he had been enchanted by the Spitfire and her virtues and there was a twinkle in his eye whenever he drew near one of our aircraft, like he would suddenly leap up onto the wing and get her started for a quick trip, even in his 90s. It was thanks to Nigel that we found out much about our home airfield and its history… His stories and recollections enabled us to learn much about the daily life of a fighter pilot, their routines, and methods of relaxation. He left a lasting legacy with our staff and it's a real privilege to be able to put our aircraft into a colour scheme that represents one of the aircraft he flew."

Nigel Rose died in Hay-on-Wye on 10 September 2017, aged 99. He was pre-deceased by his two older brothers, both of whom had also served during the war, and likewise lived well into their 90s. By that stage this cultured man — an aficionado of poetry, a keen amateur artist and musician — was already among the last of 'the Few'. Anyone who met him and had the privilege of listening to his eloquent recollections will understand the fondness with which he's remembered to this day.

At the Members' Meeting, the Goodwood circuit's annual season-opener, a regular fixture is the Tony Gaze Trophy race. Contested by 1948-54 sportscars, it pays tribute to those formative years and the key role played in them by one man from Westhampnett's wartime epoch. Now, a Goodwood-based Spitfire salutes another of that generation, and it is hard to think of one more deserving than the self-effacing Nigel Rose.

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462/24

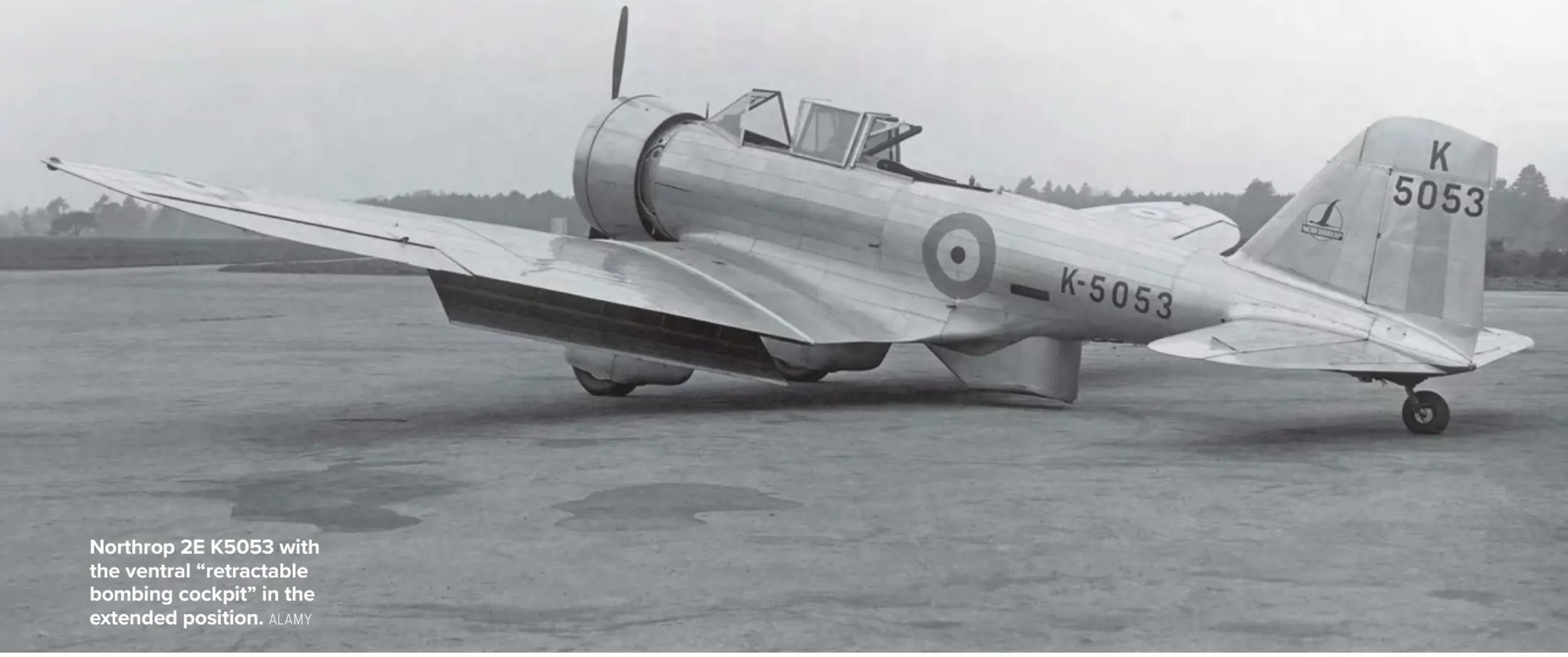
GAMMA DAYS

A brief evaluation of the Northrop 2E Gamma light bomber by the Royal Aircraft Establishment brought an unsurprising conclusion: this fairly modern monoplane was an advance on contemporary biplanes. But why was Britain interested in the first place? **WORDS:** BEN DUNNELL

K5054. Everyone knows what that refers to. It must be one of the best-known British military aircraft serial numbers of all, having adorned the prototype Supermarine Type 300, still to be dubbed the Spitfire when it flew for the first time but imbued from the outset with tremendous purity of line. But what about K5053? Now that was another matter.

As fascinating as it was, the Northrop Gamma, ill-proportioned and almost dominated by its enormous undercarriage ‘trousers’, was hardly a beautiful aircraft. Developed by the Northrop Corporation of El Segundo, California on the basis of the earlier Alpha, as originally designed it shared its predecessor’s role of rapid passenger and mail transport. Famous examples — specifically the first two built during 1932 — conducted record-breaking flights, in the case of the Gamma 2A *Sky Chief*, and research activities in Antarctica, with the 2B *Polar Star*. The latter achieved fame in November 1935 by making the first ever trans-Antarctic flight, proving just what a capable design this was. By then the RAF had found out, too, thanks to the single example on Air Ministry charge: the aforementioned K5053.

But this was a rather different beast when compared with those two most illustrious Gammas. Northrop had developed the 2C as a much-revised



Northrop 2E K5053 with the ventral “retractable bombing cockpit” in the extended position. ALAMY private-venture attack version, with an 1,100lb bomb load and a total of five 0.30in machine guns, and in 1933 it was evaluated by the US Army Air Corps at Wright Field, Ohio. Upon further modification, it was acquired by the army during June 1934 and called the YA-13. An engine change from 735hp Wright SR-1820-F2 Cyclone to 950hp Pratt & Whitney R-1830-7 Twin Wasp brought a redesignation to YA-16. It was, however, Wright power that the Republic of China selected for its Gamma 2E light bombers, effectively an offshoot of the 2C. Forty-nine were ordered, the variant being distinguished by the addition of a retractable ventral station for the gunner/bomb aimer just aft of the wing. Production was split roughly half-and-half between Northrop itself and the Central Aircraft Manufacturing Company (CAMCO) in Loiwing. And it was another 2E model that came to Britain.

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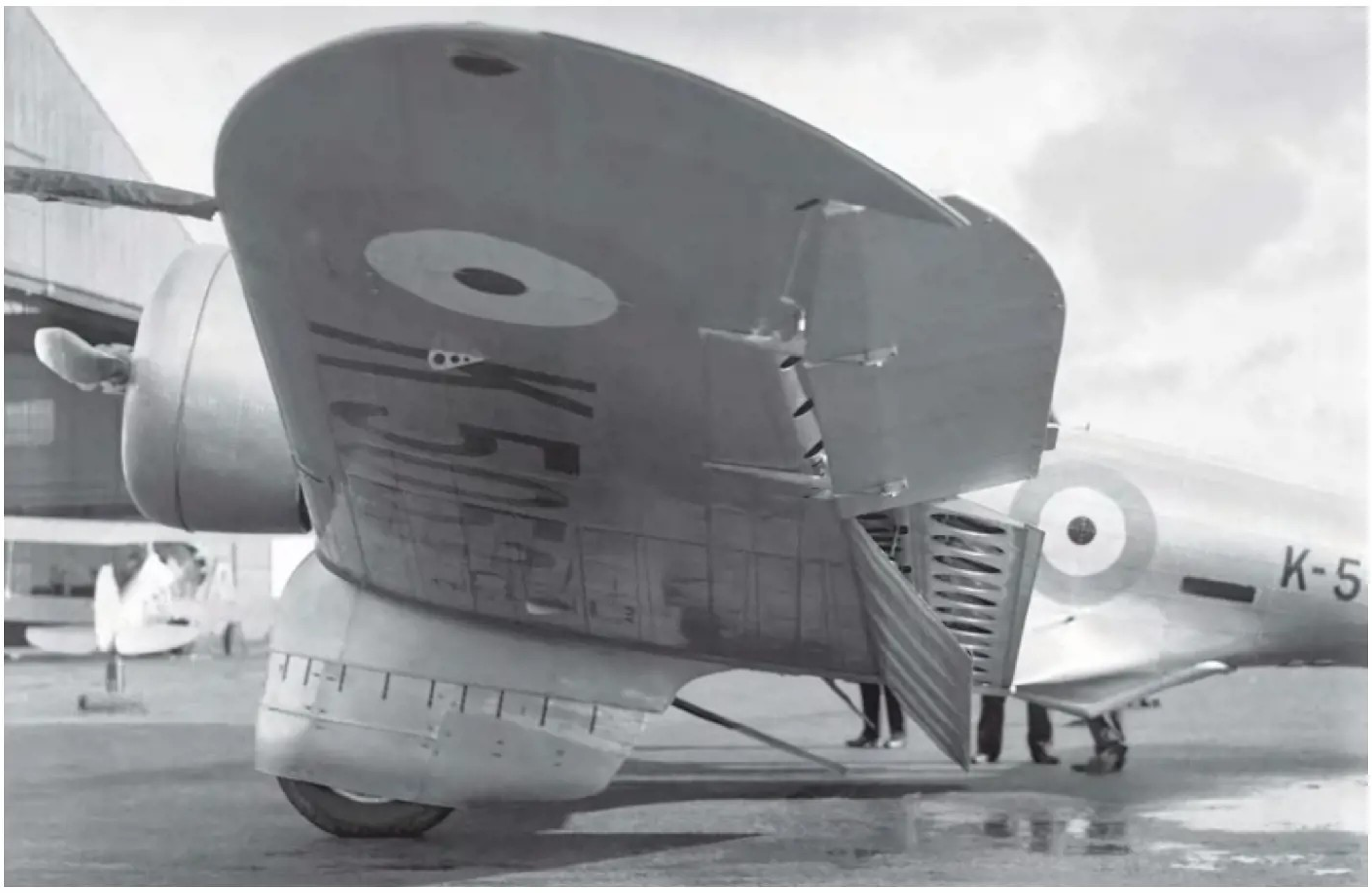
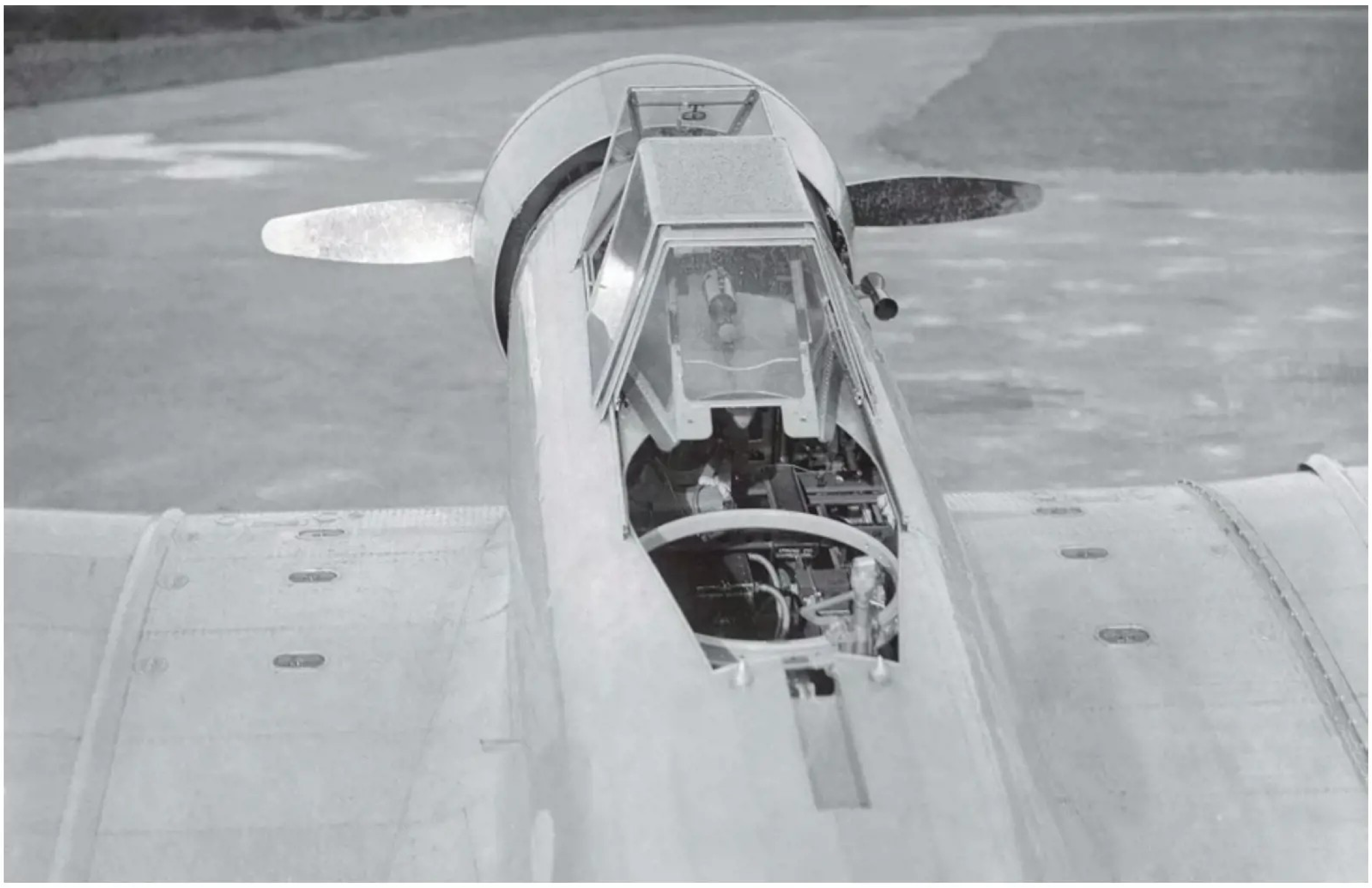
Some sources claim this aircraft was the 2ED-C, which had been built for demonstration purposes and carried out a tour of Central and South America in early 1935 as part of preparations for a putative air race around the continent. However, this is somewhat negated by the fact that the 2E acquired by the Air Ministry had arrived on British shores during November 1934. K5053 had constructor's number 13, whereas the 2ED-C was 47, and ended up heading back to the US before being sold to Russia. The background of K5053 is not, seemingly, documented, but there is nothing to suggest it was anything other than a new-build airframe. Specifications cite the Wright Cyclone engine as developing 715hp, while the bomb load could comprise 10 100lb, two 600lb or one 1,100lb bombs situated between the undercarriage legs.

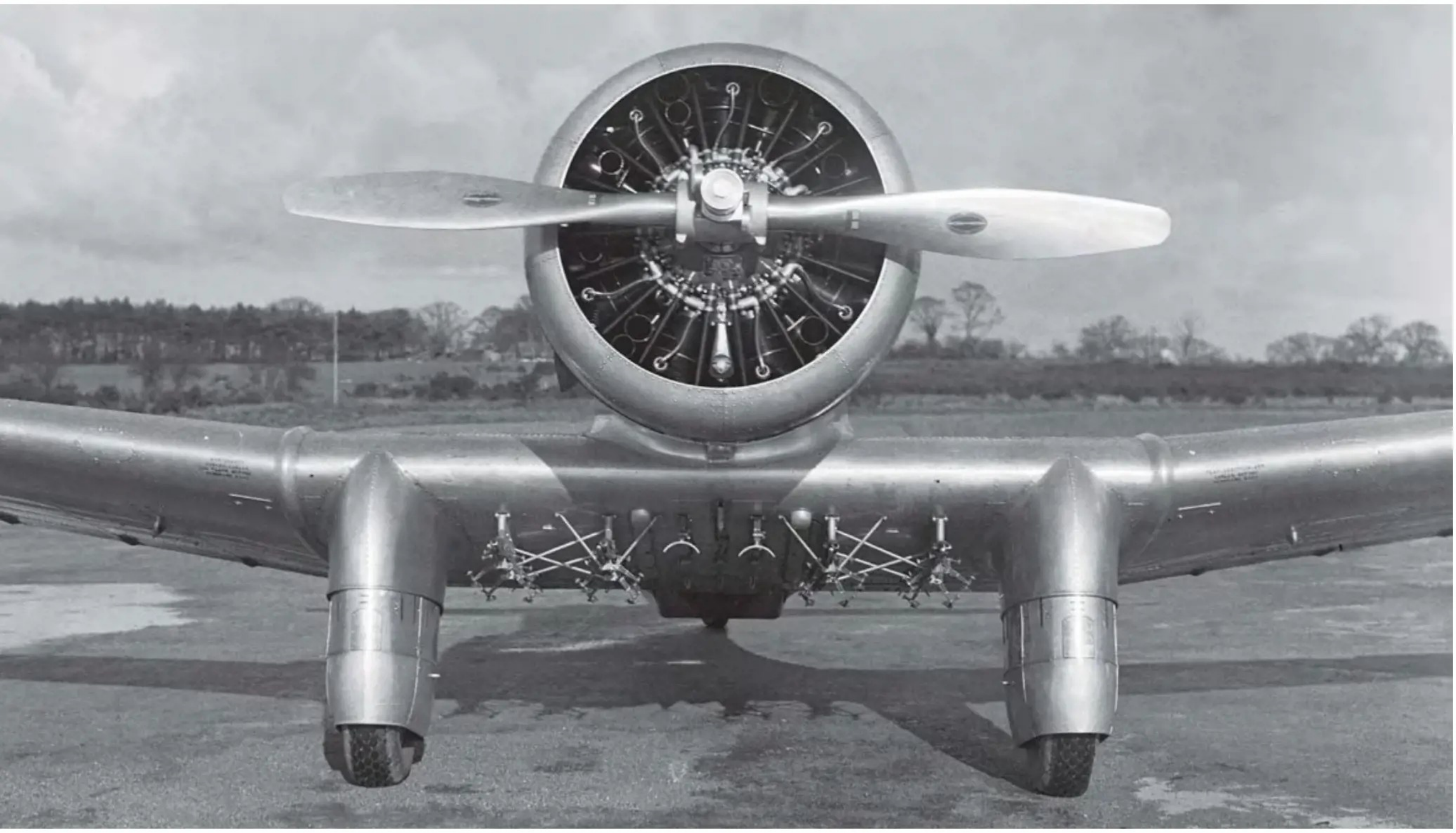
In its 7 February 1935 issue, *Flight* outlined the rationale behind the Air Ministry's purchase of the Northrop. It was simply, the journal said, "in accordance with the policy of acquiring examples of some of the more outstanding foreign types of aircraft from time to time". And the 2E represented the state of the art as an all-metal, enclosed-cockpit monoplane bomber, since the RAF's first monoplane for the role, the twin-engined Fairey Hendon, was not to enter service until 1936. This was despite the fact, *Flight* went on, that the Northrop was "not by any means a new type, and, in fact, an obsolescent aeroplane as military



ABOVE: **The split flaps deployed, with the fabric-covered ailerons up, and the sighting turret retracted as far as it would go.** *AEROPLANE*



LEFT: **The Northrop's glasshouse was ungainly, but interesting in that the panels could slide to afford either an open or closed configuration for each cockpit.** *AEROPLANE*



ABOVE: Modification by the RAE saw English universal bomb carriers substituting for four of the American bomb racks. *AEROPLANE*

aircraft go, the prototype having been built more than two years ago". Nevertheless, the piece went on, it gave "an indication of what can be done by very skilful design."

Once it reached Britain, K5053 was allotted to the Royal Aircraft Establishment at Farnborough "for erection and preliminary handling trials, and for the fitting of certain items of English equipment". Foremost among these was provision for the carriage of four 250lb bombs, this facilitated by the addition of four universal-type carriers to replace four of the original American bomb racks. RAE test pilot Arthur Clouston is known to have used it, along with other types, for research into ice formation on aircraft. Performance testing, meanwhile, saw the 2E being transferred to the Aeroplane and Armament Experimental Establishment at Martlesham Heath.

Once the bomb carriers were mounted, the RAE reported that a test flight revealed "a somewhat startling decrease in performance, which seemed worthy of further investigation". Comparative tests were duly carried out, measuring the maximum speeds attained in level flight at full throttle with, variously, no bomb racks fitted, the original 10 American racks, four English universal carriers substituted for four American racks, and a quartet of 250lb RL MkI bombs on the universal carriers. They showed a 9mph reduction in maximum speed with the 10 American racks, and a further 16mph reduction when the four English universal carriers were fitted. When the four bombs themselves were added to the universal carriers, top speed decreased by another 21mph, ending up fully 46mph slower than the clean aircraft.

> ***"Stainforth said it was 'very straightforward and easy to fly'"***

When a "rough calculation" of the 2E's drag in each of the four configurations was conducted, again the results were obvious. There was an 8.5 per cent increase with the American racks, more than 31 per cent with the four universal carriers and six American racks, and no less than 67 per cent with bombs slung. Using lower-drag bombs than the obsolete ones made available for the test could bring about a small improvement, but no more. The conclusion drawn was that the performance loss could be attributed primarily "to the awkward passages between the bombs and the wing surface and to the obstruction to the flow caused by the bomb carriers."

While commenting on the Northrop's "very clean design", RAE scientists J. E. Serby and H. B. Squire noted some of the other aspects which spoiled its streamlining. The cockpit cover, they wrote, was "high and only crudely faired" — *Flight* called it a "'conservatory' roof" — while the base of what the authors termed "the retractable bombing cockpit" protruded from the underside even when in the retracted position.

Much attention was paid to the split trailing-edge flaps, which extended, *Flight* reported, "over about two-thirds of the span of the outer wing portions, their inner ends being at the wing joint". The slotted ailerons were fabric-covered, "and are the only surfaces on the machine to be so covered". RAE flight-testing found the 2E, because of its clean layout, to be "difficult to land (without using flaps) in any but a large aerodrome". Indeed, the flaps were deemed "an almost indispensable aid to landing". The elevator trimmers were found "satisfactory", but with a forward centre of gravity and the flaps down, "there is hardly sufficient elevator control to get the tail down in landing if the trimmers are 'right back.'"

The appendix to the RAE report was written by test pilot Flt Lt George Stainforth AFC, former Schneider Trophy competitor and world air speed record-holder with Supermarine S6B S1595 between 1931 and '33. On the ground, he found the steering excellent, the wide-track undercarriage giving "very good stability". Taking off with the throttle pushed to the gate, about 37.5in boost, involved a 114-yard run in a 12mph wind with flaps down 15°. The initial climb was made with the variable-pitch propeller in low pitch and the throttle kept at the gate, achieving 110mph indicated; the propeller pitch control was "easy to reach and operate", and there was no harm in making frequent changes. Over-revving at low pitch was to be avoided, and no diving with the throttle closed was carried out with the prop in low pitch for exactly that reason.

What of the flying controls? Stainforth concluded that they were "Well harmonised and efficient, though rather heavy; bearing in mind the duties of the type, they are considered satisfactory". The rudder was "Not ordinarily required". He opined that the elevator was "Rather heavy, specially in steep turns", but "Very effective". The ailerons were "Medium weight at the lower speeds, heavy at high speed. As this is partly due to the lateral stability, flying in bumpy weather is not in the least tiring; quick turns can be done when necessary. Heavier than Hart and Airspeed Courier; lighter than some Bulldog machines at high speed. Very efficient down to the stall. No adverse yaw. A trace of effect at and after the stall."

Stainforth said the 2E was "Just stable" in roll and pitch, and in yaw, "Very stable. If rudder is pushed over and then released when flying level, the machine straightens at once after about one swing each way". It would "fly straight and level with all controls released" when trimmed using the tabs, "provided rudder and aileron trimming strips have been properly adjusted. A trimming tab for the rudder would be an advantage, as there is a slight tendency to 'carry rudder' one way on the climb and the opposite way on the level at high speed (right and left respectively)". His verdict on the tab control was "very good", it being, "Finger-light to operate" and "very effective", especially "to assist elevator in steep turns."

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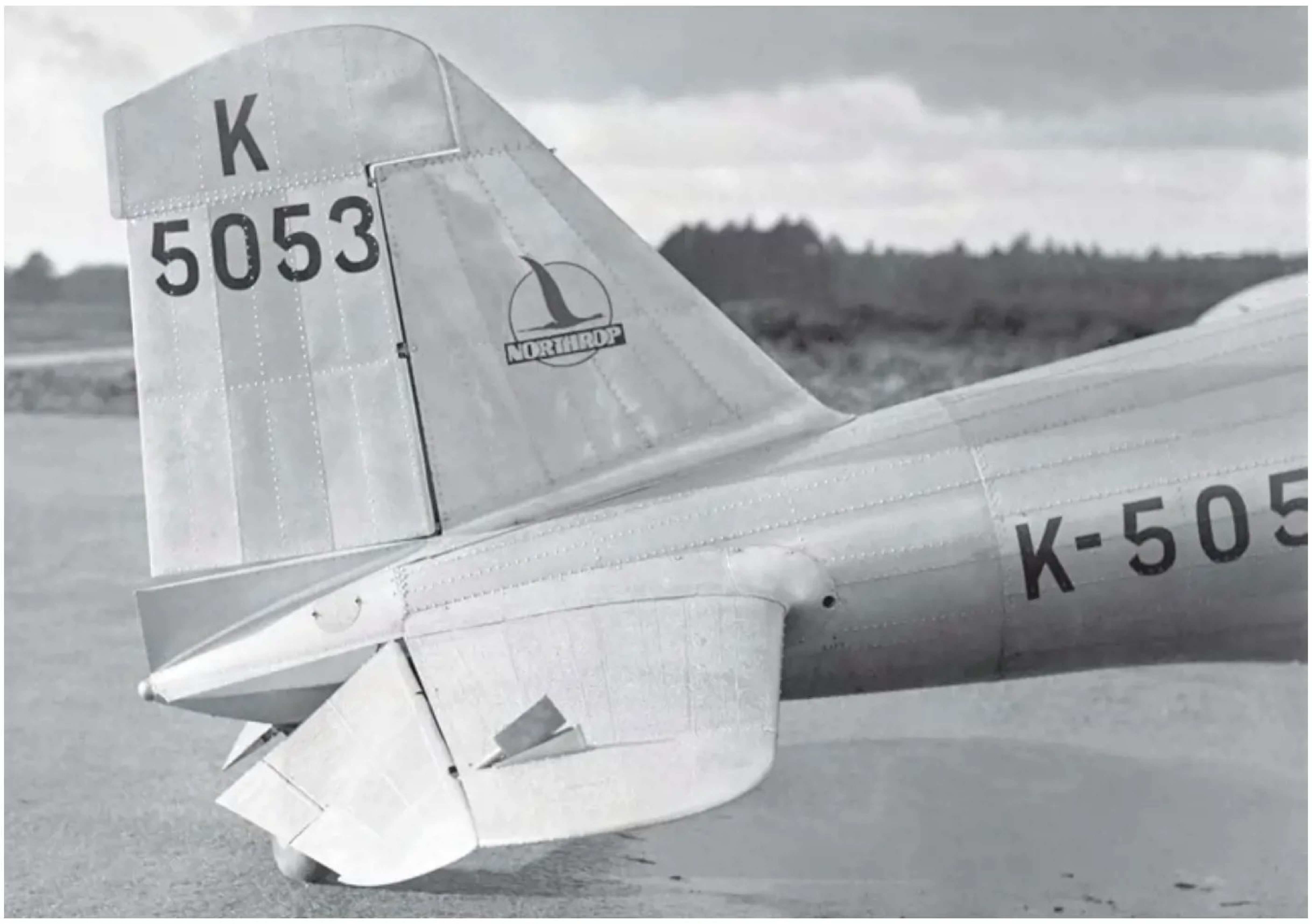
Making general comments on flying the Northrop, Stainforth wrote of how "it flies very steadily at all normal speeds", and was "a good gun platform… She can be comfortably flown with feet off the rudder pedals owing to excellent directional stability and good ailerons… turns with stick alone are satisfactory". He liked the landing flaps, too, since they gave a "Steep and variable gliding angle", reduced the landing speed by some 8mph or 13 per cent, improved the pilot's view, reduced 'float' by a significant degree, made attainment of a correct approach speed "much less critical" and helped on take-off. Stalls were tried in different configurations, a warning coming about 2-3mph early in the form of a dropped wing. This was "more vicious" without flaps, while the ailerons helped the rudder in checking a post-stall 'falling leaf' tendency.

Little consideration was given to tactical aspects in the RAE assessment, but Stainforth did make some related comment when discussing the view out. "The wing blocks the view downwards", he said, adding, "From a tactical point of view, enemy aircraft below cannot be seen by the pilot. In most respects, however, the view is much better than that from a Service biplane, particularly as regards safety from collision, and look-out in the upper hemisphere."

There was never any serious possibility of the Northrop 2E being ordered by the Air Ministry, no matter how good it was for its day. The ultimate fate of K5053 once it was struck off charge, the evaluation complete, is so far undocumented. Just one other Gamma, the 2L model registered G-AFBT, made it to Britain, being used by Bristol as a Hercules engine testbed. Nor did the production attack version for the US Army, the A-17 — designated as the 2F by Northrop — enjoy long service, for although it was ordered in quantity, a decision to make future attack types for the service multi-engined brought a premature end to its employment.

But when you consider how, just a few months after the RAE wrote up its findings on the 2E, the Royal Review of the RAF presented an all-biplane front-line force, no wonder the American monoplane impressed. George Stainforth's verdict was unequivocal: "This aircraft is very straightforward and easy to fly and is, in performance, comfort and many other respects, an advance on Service aircraft of corresponding type."

BELOW: Trim tabs were fitted to the elevators, while the mass balances disappeared into the tailplane. The Northrop logo was worn on the 2E's tail, and a servicing representative from the manufacturer was on hand, at least initially. *AEROPLANE*



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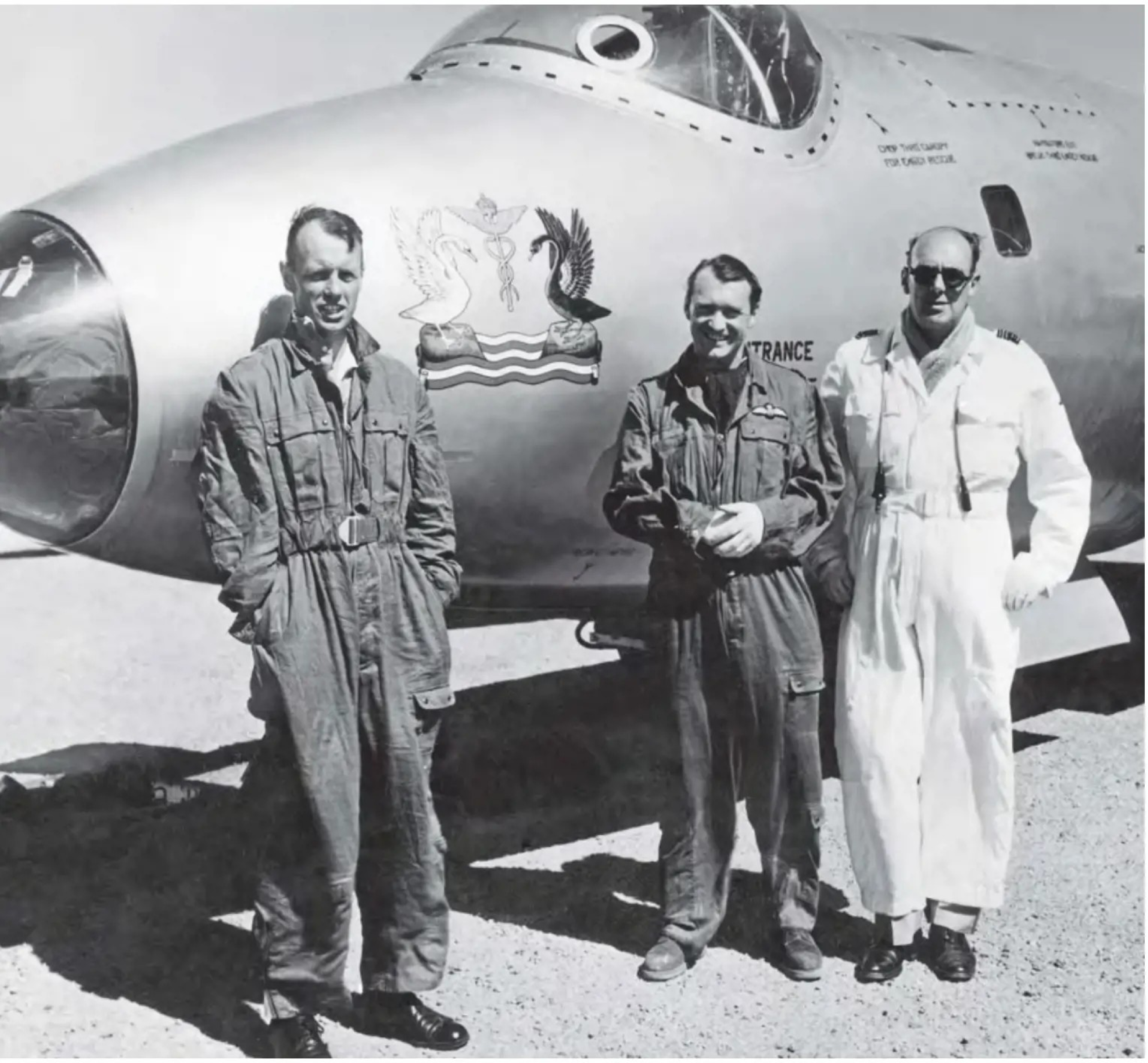
Mustang NZ2422, in which Allan George flew his second radiation cloud sampling flight, at Ohakea in a rare colour image taken during 1953. AIR FORCE MUSEUM OF NEW ZEALAND

Into the gates of hell

The first British nuclear weapon test at a range in South Australia, 1953's 'Totem 1', turned into a major controversy — or, rather, its aftermath did, as the radioactive cloud drifted towards New Zealand. For the crews of Royal New Zealand Air Force and Royal Australian Air Force air sampling aircraft tasked with flying through it, the risks were high **WORDS:** GRANT NEWMAN

The blast from the 'Totem 1' detonation. GETTY



ABOVE: **The crew of Canberra WH738 for its sampling sortie: from left to right, navigator Wg Cdr E. W. Anderson, pilot Wg Cdr Geoffrey Dhenin and observer Gp Capt D. A. Wilson. The crest on the aircraft featured the white swan of England on green fields facing across the sea and the black swan of Australia on desert sand centred on the badge of the Medical Branch of the RAF.** IWM VIA GETTY

At RNZAF Base Ohakea on 15 October 1953, Sqn Ldr Allan George, the station operations officer, climbed into the cockpit of North American P-51D Mustang NZ2404 and taxied out for take-off. Suspended from the pylons under the aircraft's wings were cylindrical objects with holes at the front, about the purpose of which George was none the wiser.

After getting airborne, George spent around two hours in the air, growing increasingly cold as the time wore on. He flew at an altitude of 25,000ft in the skies above the Wanganui and Kapiti Coast areas to the capital, before landing to a peculiar reception. On taxiing in, he was met by technical personnel with British accents dressed from head to toe in protective overalls, who removed the strange cylindrical objects from his aeroplane and carted them away.

Accompanying the technicians to the office of a nearby hangar, George watched as target pieces were removed from the cylinders and a Geiger counter was produced, which clicked and squealed furiously when passed over the target pieces. "The bloody thing went mad!", George colourfully recounted in 2004. "I estimated it clicked between five and six times a second". Unwittingly, he had just flown into a radioactive fall-out cloud from the 'Totem 1' nuclear test that had taken place in Australia the day before.

> *"The Geiger counter clicked between five and six times a second"*

More than 2,200 miles away from Ohakea, at Emu Field, South Australia at 07.00hrs on 14 October, 'Totem 1' was the first nuclear weapon test on the Australian mainland carried out by the British government as it raced to produce a viable deterrent to the Soviet Union's burgeoning atomic programme. Mounted at the top of a tower, the weapon's blast was calculated to be around two to three kilotons (Kt) nominal yield, its equivalent in conventional TNT explosive, but it registered a far higher yield of 10Kt, 5Kt less than the total yield of the 'Little Boy' bomb dropped on Hiroshima on 6 August 1945.

Following the detonation, the characteristic mushroom cloud rose to a height of 15,000ft, maintaining its form for the next 24 hours. It was initially believed the fall-out pattern would have been reduced because of its motionlessness, but — unpredicted by climate scientists before the blast — high winds caught the fall-out and it drifted precariously to the east, across the continent towards New Zealand.

The blast's shockwave sped across the landscape, producing phenomena scientists had not witnessed from the first British nuclear test, Operation 'Hurricane', off the Montebello Islands a year earlier. The erupting dust from the 'Totem 1' explosion congealed into a thick black mist that moved ominously over the land for miles, tainting everything in its path with flecks of fine black radioactive dust. Soon afterwards, people of the local native tribes began to mysteriously fall ill.

Back in New Zealand on the 16th, George boarded another Mustang, NZ2422, similarly equipped with samplers under its wings. His flight path and duration took him over the same area of the country as his sortie the previous day and, again, he felt the cold. Recorded in his logbook are simple entries betraying nothing of these flights' menacing nature: "2 hrs local @ 25,000 ft", both actually at two hours 45 minutes' duration.

By 1953, George was a decorated senior pilot with the RNZAF, having flown bombers in the RAF during World War Two. He was rewarded for his efforts, having received the Distinguished Flying Medal in 1941 and the Distinguished Flying Cross in 1942 for "outstanding coolness, courage and determination", according to his DFM citation, while captaining Vickers Wellingtons on night bombing raids. By far, however, according to his reckoning, the two Mustang flights following the 'Totem' blast were the oddest of his entire career.

Servicing the Mustangs' air samplers were British technical personnel operating under the somewhat incongruous guise of the RAF's Oxygen Unit. Their real purpose in New Zealand was to examine the extent of fall-out from the 'Totem 1' explosion. George recalled in 2004, "It was a cover-up name, because they were doing radioactivity tests no-one else knew about."

The severity of the radiation cloud's measurement over New Zealand was of considerable interest to the British because, according to data gathered on previous flights after the 'Totem 1' blast, the levels of radiation were the strongest of any nuclear explosion experienced by any of the nations whose aircraft collected samples. That month, the RAF instigated Operation 'Hot Box', which comprised RAF personnel and English Electric Canberras sent to RAAF Woomera, South Australia with the intent of flying through the radiation clouds from 'Totem' detonations. Just one Canberra was used to fly into 'Totem 1's' blast cloud, B2 WH738, which was fitted with radiation sample collectors at its wingtip fuel tank stations and was highly polished by groundcrew in advance.

WH738's crew on 14 October comprised pilot Wg Cdr Geoffrey Dhenin, who was a specialist doctor, with navigator Wg Cdr E. W. Anderson and radiologist Gp Capt D. A. Wilson. Once the men boarded the Canberra, its entry door and openings were sealed with tape, while the crew wore oxygen masks throughout the flight. In the air, seconds after the detonation, Dhenin turned the aircraft away from the blast. The entire sky turned white in a flash before the steaming cloud erupted into the air, an ominous heat wave violently rocking the aeroplane.

Dhenin then approached the cloud's apex as it slowly rose, flying through its edge. Having deciphered it was not "too hot", six-and-a-half minutes after 'Totem 1's' detonation, Dhenin turned into the rising cloud. He flew directly through it and out of the opposite side, the aircraft shuddering and shaking as it pushed through the boiling mass of dirt and dust. Inside the gas cloud, the crew recorded that all went dark, forcing them to switch on lights to illuminate the cockpit.

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A further pass was made over the rising cloud and another beneath the billowing cap, before Dhenin returned the Canberra to Woomera, ending the first flight into the interior of a nuclear blast cloud by an RAF aeroplane. Owing to the high doses of radiation WH738 was exposed to, the feat was not conducted again by that aircraft and crew during the 'Totem' tests. The remaining cloud sampling flights, the British decided, were to be flown by RAAF Avro Lincolns.

After WH738 returned to Woomera, the samples were despatched to Darwin to be transported back to Britain by the RAF Canberras that had competed in the recent London-to-Christchurch Air Race. Arriving at Harewood, Christchurch seven days before the 'Totem 1' test, just under 24 hours after departing London Airport, the winning aircraft in the speed section was Canberra PR3 WE139, one of three No 540 Squadron, RAF Canberras that took part in the race. The others were PR3 WE142, the third-place finisher, and fourth-placed PR7 WH773.

While Flt Lt 'Monty' Burton in WE139 was directed to return to Britain via multiple stops over several days doing demonstration flights, the Canberras provided a hasty shuttle service for the radiation samples. To transport the radioactive material, it was placed in a lead-lined container housed within a girder structure nicknamed the 'Forth Bridge', which fitted inside the bomb bays.

Curiously, in advance of the 'Totem' tests, the British had advised the Australians there was no risk to personnel from exposure to radiation, so the precautions afforded the 'Hot Box' crew were

BELOW: Canberra PR7 WH773 ferried atomic cloud radiation samples back to Britain after the 'Totem 1' test.

AIR FORCE MUSEUM OF NEW ZEALAND

ABOVE: Lincoln A73-53 at Momote in the Admiralty Islands. This aircraft was flown by Gp Capt Maurice Onions into ‘Totem 1’s’ mushroom cloud and was heavily irradiated afterwards. ROLAND JAHNE COLLECTION

not taken by the RAAF in respect of its Lincolns and their crews. During the Operation ‘Hurricane’ detonation on 3 October 1952, Lincolns flew sampling flights into the radiation cloud for the first time. That year, the RAAF Airborne Radiation Detection Unit, comprising 10 Lincoln Is and two Dakotas employed for transport duties, was formed at Woomera. Its commanding officer was Sqn Ldr Geoffrey Tuck, who piloted Lincolns through ‘Totem 1’ and other radiation clouds from nuclear tests at Emu Field. Before taking command of the unit in October 1952, Tuck was in good health. In the wake of the ‘Totem’ tests, he rapidly began to deteriorate.

Tragically, less than three years afterwards, Tuck fell ill from a rare form of testicular cancer and died. He was just 34 years old. His grieving family was not informed of the cause of his death and requests for information to the Australian Defence Force were repeatedly denied. Tuck’s service records did not record it, and not until 2001 was the cause of his death revealed, when his name appeared on a newly released list of RAAF aircrew who had flown cloud sampling flights.

Of the Lincolns sent to Woomera, six were detached from No 6 Squadron, No 82 (Bomber) Wing based at RAAF Amberley, Queensland. The first to carry out a cloud sampling flight was A73-53, captained by Gp Capt Maurice Onions, who led a seven-man crew. On that day, Onions carried out two flights in A73-53, entering the cloud at 20,000ft. Beforehand, RAAF Lincoln crews had arrived at Woomera three months in advance of ‘Totem’ and underwent extensive training, many having volunteered for what they were told was a special mission.

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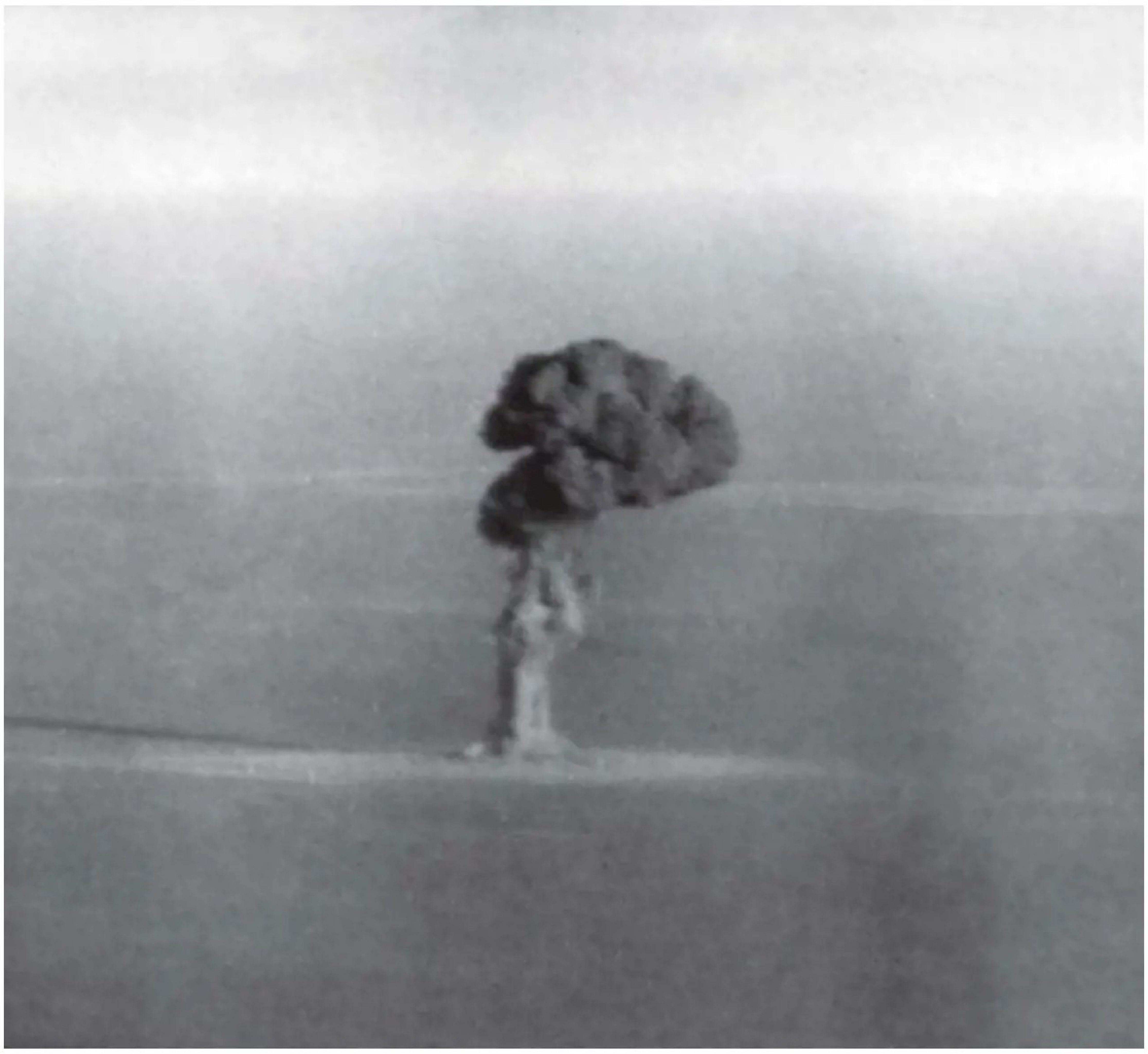
For his first flight, Onions was instructed to fly a north-south trajectory over the target area, some 30 minutes before detonation, 15-20 miles from the blast zone. Just before the explosion, Onions put the aircraft into a banking turn so as to face away from the blast, as Dhenin did with Canberra WH738.

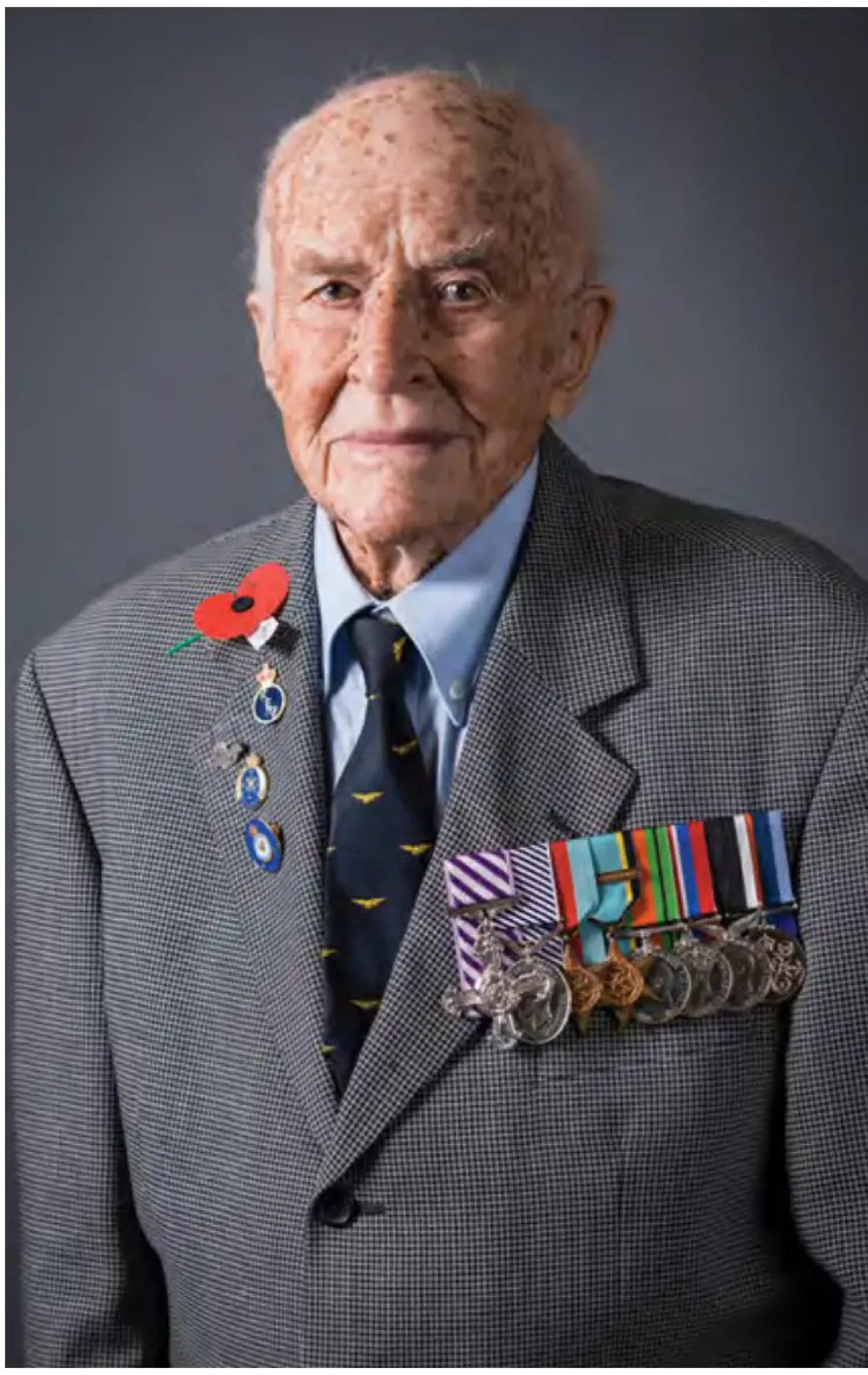
Photographs were taken of the cloud before Onions was instructed to fly into it by British ground controllers voicing instructions over the radio. He guided the aircraft towards its stem below the peak, which was, according to crew member Sgt Edward Cheney — who was operating the cameras aboard — “like flying into a tornado. I had flown into storm clouds before to collect temperatures so I thought I knew what was coming, but this was something else. It was like flying into the gates of hell…”

On returning to Woomera from their ‘Totem’ sampling sorties, the Lincolns were each hosed down by shirtless groundcrew. They were completely unaware of the risk to themselves as water loaded with radioactive material cascaded from the aircraft, thoroughly drenching them. By consequence, some of these men inexplicably fell ill and, like Tuck, later died of mysterious causes that were not revealed to their families for decades.

Aboard the US Air Force’s two Boeing WB-29As engaged in monitoring the explosion on the invitation of the Australian government, the radiation readings were off the scale and, said the Americans, the most severe they had recorded in all the cloud sampling flights they had carried out. The presence of the gleaming USAF aircraft in Australia aroused curiosity among the public, but, naturally, their true purpose was not disclosed at the time.

Based at RAAF Richmond, north of Sydney, the aircraft were fitted with far more sophisticated equipment than their erstwhile





allies' cloud samplers and featured a distinctive box-shaped scoop on an elevated platform atop the fuselage, aft of the wing. So as not to reveal the real nature of their visit to Australia, the RAAF released a vaguely worded statement claiming the WB-29As were "flying meteorological laboratories", which in effect they were.

Like the precautions carried out by the 'Hot Box' crew in sealing WH738, the USAF did the same with its aircraft and, wearing face masks, the crews were ordered not to eat and smoke during the flights. They were, however, instructed by the British to remain 400 miles (640km) downwind of the test site as only RAF and RAAF aircraft were permitted to fly into the cloud.

The Australians and the Americans forecast different paths the radiation cloud could take after it dispersed. Erroneously, the Australians tracked the cloud northwards on a course towards Darwin, whereas the Americans, with the aid of their more sophisticated detection equipment, accurately predicted an eastbound trajectory in the direction of Brisbane on the east coast, before it crossed the Tasman Sea.

There is no evidence the New Zealand public was made aware of the presence of the radiation cloud over the lower North Island that spring. Official documentation detailing the errant 'Totem 1' cloud's path is hidden away in archives around the country.

Following publication of his story in the *Taranaki Daily News* on 27 December 2004, Allan George signed a sworn affidavit on 24 April 2008 recounting in brief the two flights conducted in NZ2404 and NZ2422 on the 15th and 16th respectively. George passed away on 22 September 2014, but until his death he repeatedly iterated that his flights and their awful purpose in October 1953 were true. Despite the highly precarious nature of his radiation sampling sorties, he never revealed feeling ill immediately afterwards.

> *"Four Lincolns were so irradiated they never flew again"*

It was found after 'Totem' that nine of the Airborne Radiation Detection Unit Lincolns had been badly contaminated, eight of them requiring what were euphemistically called "special procedures" in an attempt to decontaminate them. Of these, four were irradiated to the extent that after being flown back to Amberley, they were classified as 'highly contaminated' and never flew again. These aircraft, A73-25, -47, -52 and -54, were parked away from the populated area of the base and marked with large crosses as warnings not to approach.

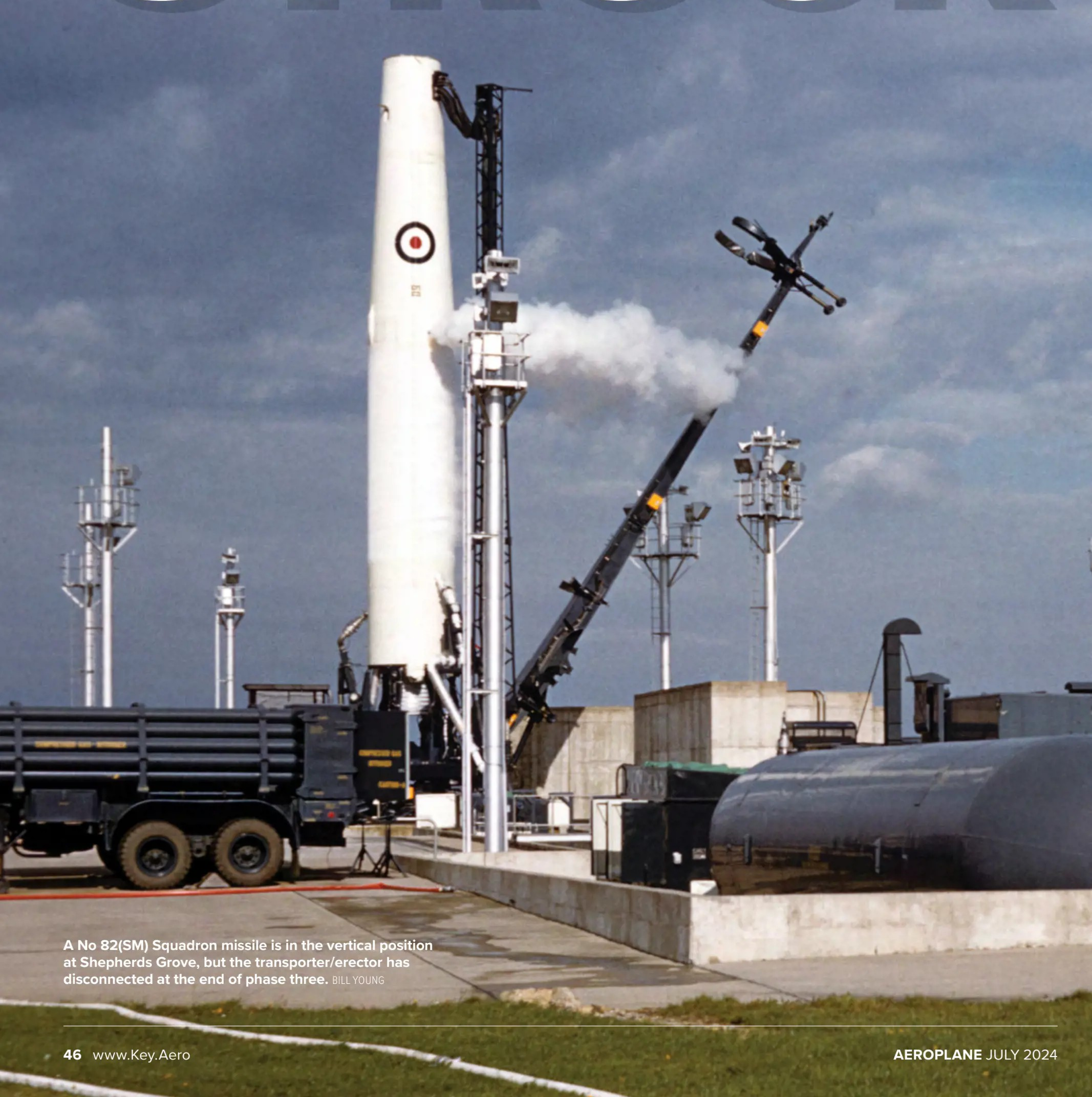
Lincoln A73-25 was burned on the Amberley fire dump before being scrapped in 1959, whereupon its remains were buried. A73-47 and -54 were damaged during a February 1957 storm, after which they too were dismantled and buried. During the McClelland Royal Commission held in 1984-85 on the British nuclear tests in Australia, Australian Defence Force officials admitted that following scrapping, the remains of one of these Lincolns, A73-52, were so irradiated that they were disposed of at sea. A

Thanks to Errol Martyn, Frank Walker, author of the book *Maralinga: The chilling expose of our secret nuclear shame and betrayal of our troops and country*, and the Air Force Museum of New Zealand.

ABOVE LEFT: 'Totem 1's' mushroom cloud hangs ominously over Emu Field on 14 October 1953, probably photographed from an RAAF Lincoln.

ABOVE: Sqn Ldr Allan George DFC DFM photographed during 2014, shortly before his death aged 96.
AUCKLAND MUSEUM

THUNDER STRUCK



A No 82(SM) Squadron missile is in the vertical position at Shepherds Grove, but the transporter/erector has disconnected at the end of phase three. BILL YOUNG

The RAF's Thor ballistic missile force: with great fanfare, it arrived, but then it was gone. What happened to this part of the UK's strategic defences?

WORDS: DENIS J. CALVERT

"I well remember the evening of 19 October 1962. Master Pilot Dougie Howarth, my number two, and myself were sitting in the launch control trailer at RAF Melton Mowbray and talking about nothing in particular when the 'Bomber Box', Bomber Command control room, squawked. Normally, the next thing we heard would be the duty bomber controller saying, 'Exercise, Exercise, Exercise', followed by the appropriate codeword for whatever exercise was to be commenced. On that evening, at 19.30 according to my logbook, the message was 'Alert, Alert, Alert', followed by the appropriate codeword to bring all three missiles to alert stage two. I looked at Dougie and said, 'He didn't say 'Practice, Practice, Practice' — this must be for real', and hit the crew alert hooter button. From that point onwards, our training took over and the countdown procedure began."

Pete Wallington, a launch control officer, is recalling the height of the Cuban missile crisis, which saw the RAF's Douglas Thor force being brought to its highest state of readiness. It was the closest these intermediate-range ballistic missiles ever came to launch under operational conditions. But how had the air force ended up in the IRBM business? The story, inevitably, is as much a political affair as it is a strategic one.

The RAF's involvement with Thor started in 1956, with an American proposal that four squadrons of US-built IRBMs, two manned by the USAF and two by the RAF, could be sited in the UK. Equipped with American megaton warheads, these would provide a powerful deterrent force some years before American ICBMs — Atlas and Titan — could become operational. Britain had its own IRBM, Blue Streak, under development, but there was general agreement that operating Thor, probably for a relatively short period, would provide useful experience until it was brought into service. On 1 February 1957, a formal proposal was made to the British government, with an aggressive target of an initial in-service date of 1958.

> ***"He didn't say 'Practice, Practice, Practice' — this must be for real"***

By this time, Thor test-firings from Cape Canaveral had commenced. There were failures on the first four launches but the fifth, on 20 September 1957, was hailed as a total success. Concerns were raised about Thor's vulnerability to enemy attack, as it could not be housed underground in a silo, but the project for UK basing was given the green light, spurred on by the likelihood that the Soviet Union would deploy its own ICBMs, possibly as early as 1960. Thor's quoted range of 1,500nm made Moscow a realistic target from a British launch site, although it was clearly insufficient to reach any meaningful target if the missile were to be based in the US.

The Anglo-American agreement was signed, then made public in a White Paper on 25 February 1958. It was seen as an affirmation of the 'special relationship' between the two countries, something that had been severely strained by the Suez crisis of 1956. What was not stated was that the agreement was for a period of five years.

This was Project 'Emily', the weapon system WS-315A and the vehicle the SM-75/PGM-17A, given the name Thor after the god of thunder in Norse mythology. It thus became the first and very likely the only ballistic missile ever to serve with the RAF and to carry the red, white and blue roundel. Once it became operational, Thor would join the RAF's 'V-bomber' force as the second 'leg' of the UK's strategic nuclear deterrent.

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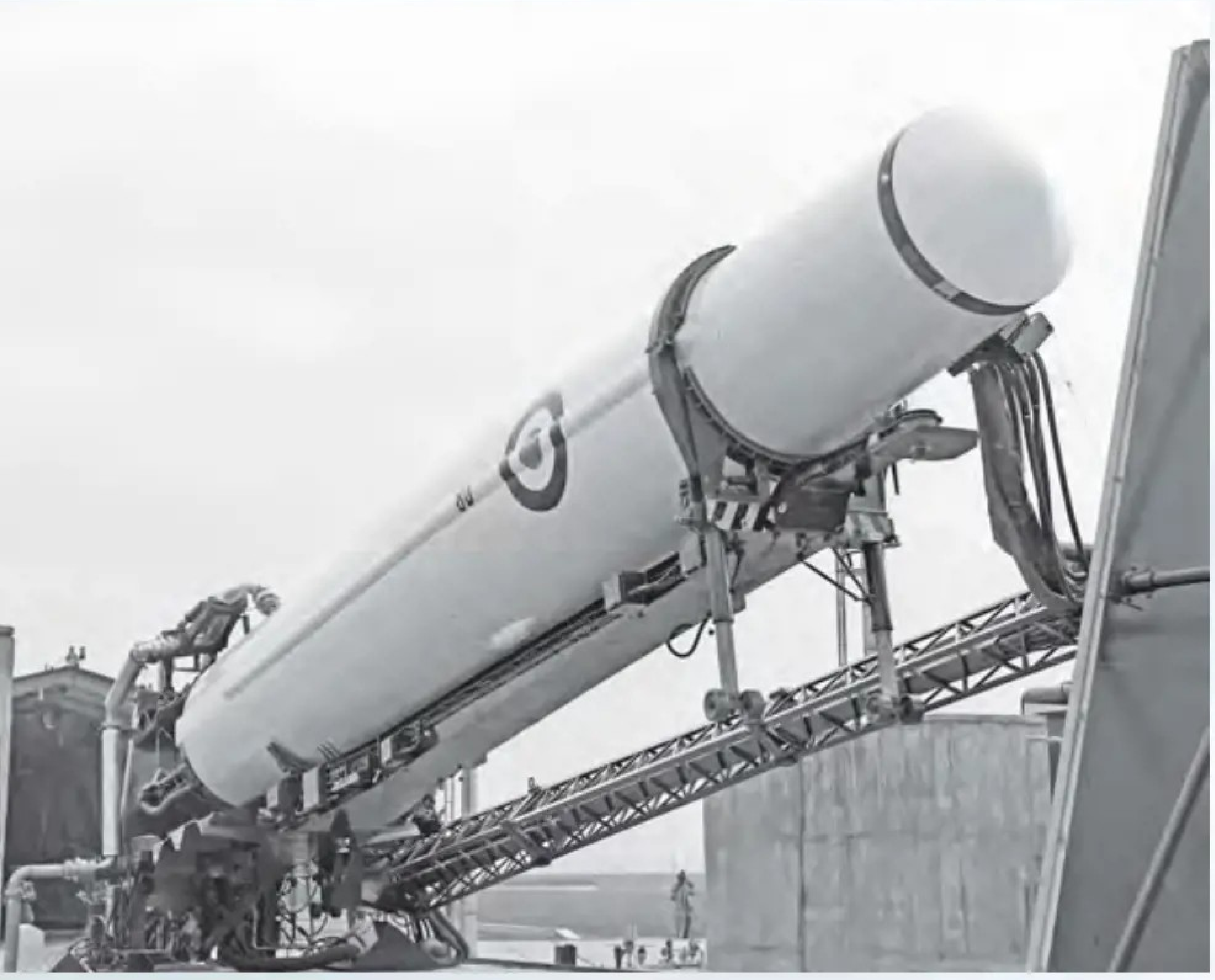

ABOVE: A Thor being raised to the vertical at Feltwell. When in the horizontal position, the missile was protected from the elements by the movable shelter, whose main structure is at left, with its fixed end wall at right. *AEROPLANE*

ABOVE RIGHT: April 1959 saw the maiden Thor launch by an RAF crew at Vandenberg AFB. TOPFOTO

In December 1955, Douglas Aircraft had been named as prime contractor for Thor, along with a large number of sub-contractors, the whole project being under the control of the US Air Force Ballistic Missile Division. Work then commenced on what was described, with perhaps an unfortunate choice of words, as "a crash program". There was considerable carry-across from earlier work on the Atlas ICBM, a yet more challenging liquid-fuelled ballistic missile with an intercontinental (5,500-mile) range. Thor was single-stage and similarly liquid-fuelled, a Rocketdyne LR-79 engine providing 150,000lb thrust. Its power derived from the RP-1 (kerosene) fuel, with liquid oxygen (LOX) as the oxidant. The missile was 65ft in length and 8ft in diameter. Much of its body was taken up by fuel tankage, with the fuel tank nearest the nose and that for liquid oxygen beneath it. The rocket engine had exhaust nozzles that could be gimballed by up to 9°, to control the missile's line of flight on its short-duration trajectory.

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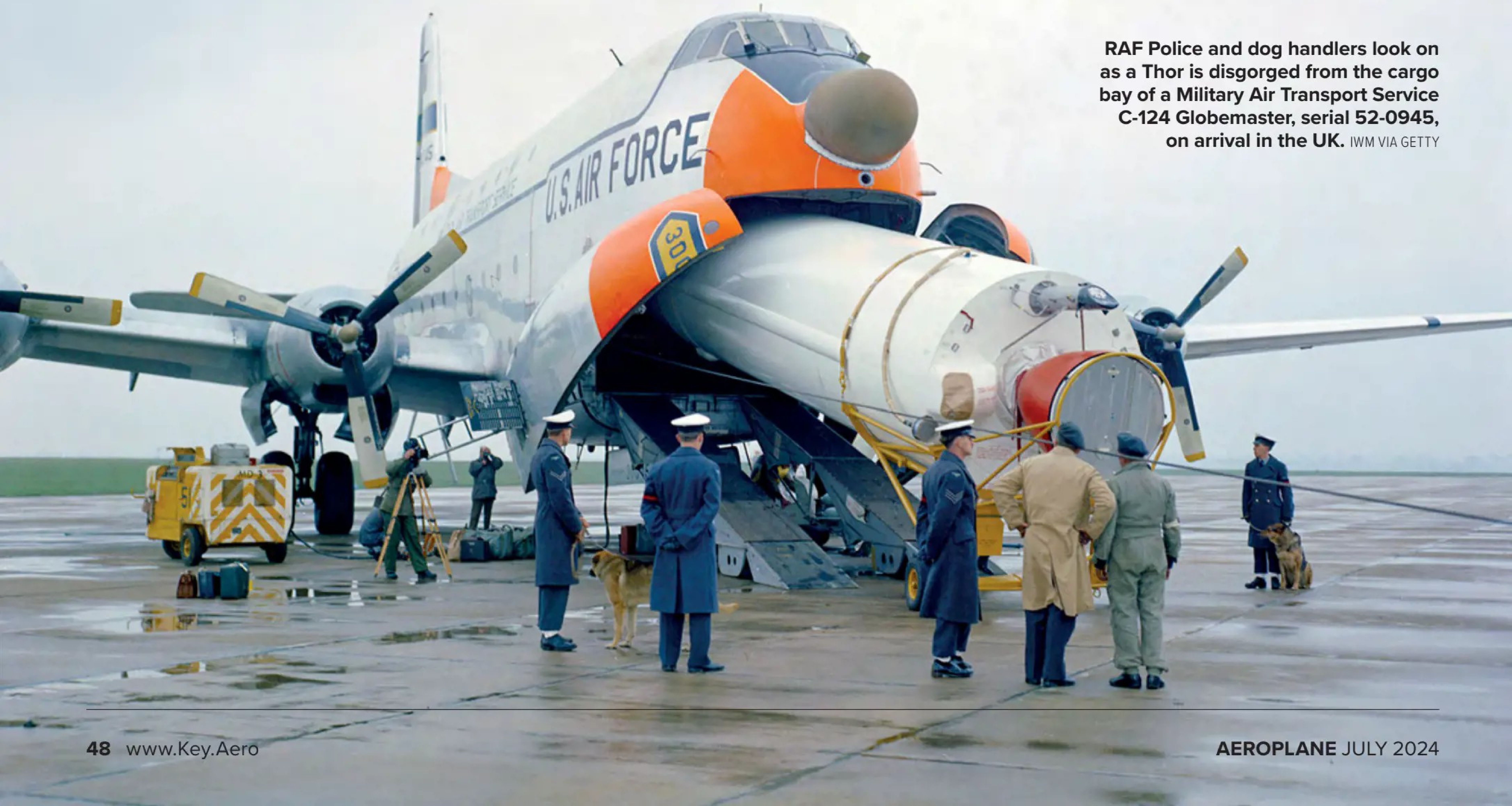
The thermonuclear warhead developed for Thor was the W-49. Designed at Los Alamos, it weighed around 1,600lb, had a yield of 1.44 megatons and was housed in the missile's blunt, heat-sink nosecone. Thor's range was 1,500 miles and, given that the nosecone's re-entry speed was around 10,000mph, no air defence system of the time had any possibility of intercepting it.

A key requirement for Thor was that it could be transported by the Military Air Transport Service's two heavy-lifters, the C-124 Globemaster II and the C-133 Cargomaster, something clearly impossible with Atlas or Titan. Thor was very much a USAF programme while, in parallel, the US Army was developing its own, alternative liquid-fuelled IRBM as the Jupiter, which would later be based in Turkey and Italy. There was a clear national imperative to get an American missile into use as quickly as possible and, despite the inevitable inter-service rivalry, the order was issued to proceed with Thor "on as compressed a timescale as we can get."

The agreement to base Thor in the UK was announced in February 1958, this stating that the missiles were to be manned and operated by the RAF, after extensive training in the States. The US would supply the missiles and all the associated equipment, along with the nuclear warheads, as well as meeting the cost of training. The warheads were to be held under the custody of the US, "in accordance with US law", and various assurances were given that they would be kept in a way precluding the possibility of a nuclear explosion. In these respects, the agreement was similar to those under which US-made free-fall nuclear weapons were supplied for the RAF's 'V-force'. Britain would provide the sites



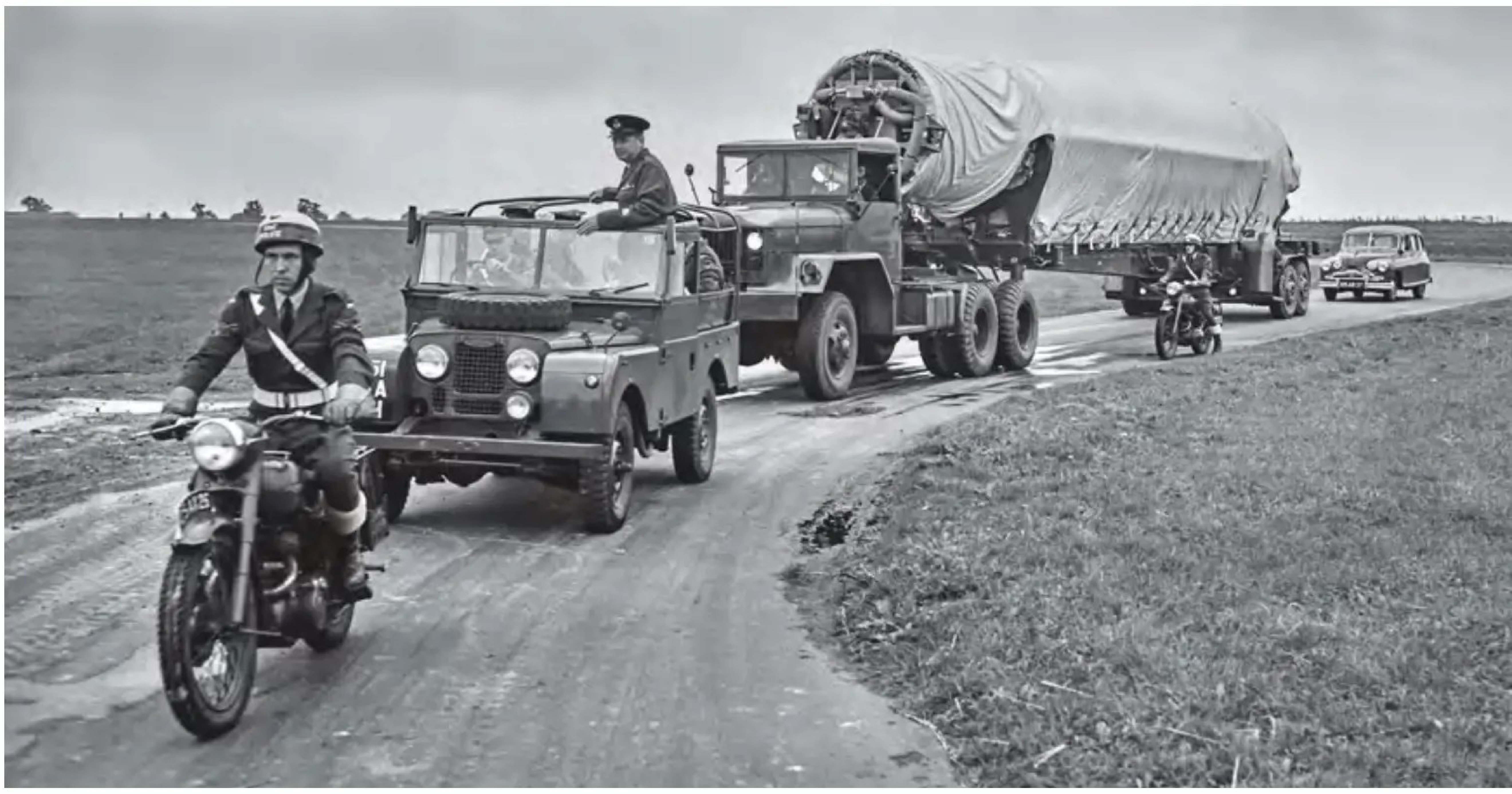
RAF Police and dog handlers look on as a Thor is disgorged from the cargo bay of a Military Air Transport Service C-124 Globemaster, serial 52-0945, on arrival in the UK. IWM VIA GETTY chosen for Thor bases and foot the bill for their construction. The missiles, effectively lent to the RAF, would be operated under a dual-key system, where an RAF launch control officer (LCO) would handle the launch of the missile, but an American authentication officer (AO) had the key to release the warhead. Only when both were present and in agreement could Thor be launched.

A rapid evaluation of airfields in the eastern part of the UK was instigated to identify suitable Thor sites. Initial announcements talked of 'four squadrons' of RAF Thors, these to be established at four main bases, which would serve as headquarters with missile maintenance and storage facilities as well as housing three launch emplacements. The main bases, otherwise known as wing headquarters, were to be at Feltwell, Hemswell, Driffield and Dishforth, at each of which an RAF strategic missile (SM) squadron would be formed.

The first was No 77(SM) Squadron at Feltwell, which re-formed on 1 September 1958. Its nominal unit establishment (UE) was 15 missiles, but the intention all along had been that each main base squadron would 'spawn' a further squadron at each of four satellite sites. Every satellite would be given its own squadron identity and have three launch emplacements and three missiles. The parent squadron would then reduce its own UE to three missiles. The RAF thus would build to a strength of 60 Thors, to be operated by 20 squadrons across 20 airfields — four main bases and 16 satellites — in East Anglia, Lincolnshire and Yorkshire, each with three launch emplacements.

A prototype Thor launch site was built in 1958 by Douglas Aircraft at Vandenberg AFB in California, initially known as pad 75-2-6 but later as Missile Launch Complex 10, then Space Launch Complex 10. It was accepted by the USAF in October 1958. This had two launch emplacements and was in most respects a smaller version of the sites to be set up in Britain.

No 77(SM) Squadron was formed at Feltwell on 1 September 1958. Between that date and December 1959, 20 squadrons were established to operate Thor, a period of activity surely unequalled in post-war RAF history. Most were 'high-end' numbers in the 1xx or 2xx range and many had an appropriate history of wartime bomber operations. Yet, subsequent to their few years with Thor, none apart from 97 and 98 has ever re-formed.



ABOVE: On 19 September 1958, the first RAF Thor is transported under escort to Feltwell in Norfolk, where it was received by No 77 Squadron. GETTY

Building work at Feltwell and its satellites — sometimes referred to as the Feltwell complex — started in May 1958, with construction at the other three main bases and their satellites getting under way over the following 12 months. Major excavation was required, before installing suitable hardcore foundations and the use of prodigious amounts of concrete. Some sites also needed the installation of piling to provide stability and to ensure the exact tolerances for the launch emplacements could be achieved.

> *"The missiles would be operated under a dual-key system"*

Thor sites, whether main base or satellite, had three launch emplacements connected to each other and to other parts of the airfield by concrete roads, these often incorporating original sections of taxiway or runway. Each emplacement had a cruciform layout with an accurately cast concrete base. At its centre was the launch mounting with, on one 'arm' of the emplacement, the 108ft environmental shelter that moved into place on rails to cover the missile when not erected. This was by no means a hardened shelter; rather, it provided protection from the elements for the missile in its horizontal position and embodied three retractable maintenance platforms.

The missile was transported to the site on its articulated transporter/erector coupled to a tractor. It reversed to position itself exactly to the launch mounting, which had been tilted 90° to mate with it. The transporter/erector then deployed its 'undercarriage' of dolly wheels which raised it up, to be aligned and attached to the launch mounting. Now the tractor could be driven away, its purpose achieved. The other two arms of the emplacement contained on one side the LOX tank and supply system and, on the other, the RP-1 fuel tank and pipeline, within a low-walled pit to contain any spillage. There were seven lighting gantries which provided a good level of illumination during darkness, but equally made the site highly visible from the air as well as to possible intruders — or protesters — on the ground. Much other equipment — launch control trailer (LCT), generator, hydraulic pumping unit, missile check-out trailer (MCOT) — was trailer-mounted. Some protection from the blast of missile launch came from two massive L-shaped concrete blast walls which, 60 years on, have proved to be the longest-lasting features of Thor sites. The warhead was not transported with the missile and would only be attached under American control once the missile was securely attached to the launch mounting.

THE THOR BASES

The initial list of 20 UK air bases to house Thor was announced in 1958. While it accurately named three of the four main bases, several of the satellite locations would be changed before the building programme started. For the record, the bases originally listed were:

Feltwell (No 3 Group, main base)	Honington*, Marham*, Watton*, Witchford*
Hemswell (No 1 Group, main base)	Bardney, Caistor, Ludford Magna, Waddington*
Driffield (No 1 Group, main base)	Full Sutton, Holme-on-Spalding Moor*, Leconfield*, Riccall*
Dishforth* (No 3 Group, main base)	Leeming*, Marston Moor*, Scorton*, Sherburn-in-Elmet*

** — airfields later dropped from the final list.*

The main bases were to be established on existing RAF airfields that had the necessary hangars and domestic facilities, things considered less important at the satellite stations. Note the major change of one main base from Dishforth to North Luffenham. Why were many of the satellite bases changed from those first announced? Practical considerations of road accessibility led to some country lanes being deemed unsuitable for the long, articulated transporter/erector vehicles that would be needed to transport the missiles. Proximity to a suitable airhead was another consideration; for the Feltwell wing this was to be Lakenheath. Comparing the final list below with the initial selection, it is notable that the major, still-active airfields such as Marham, Watton, Waddington and Leeming were rejected in favour of generally disused wartime ones, some of which had seen no military activity since 1945.

In the case of Witchford, Cambridgeshire, this by now abandoned wartime bomber base was little more than a mile from the centre of the city of Ely and its priceless 900-year-old cathedral. The argument was said to have been advanced that basing Thor there would invite a Soviet missile attack in a time of war, thus putting in peril the cathedral, not to mention the city's 12,000 residents. As a result, Witchford was quietly removed from the list, to be replaced by Mepal, another disused RAF wartime bomber station. This decision may have satisfied the church authorities, but Mepal was still located only six miles from Ely city centre.

Thus, the final RAF base list eventually comprised:

Feltwell (No 3 Group, main base)	**No 77(SM) Squadron**
Shepherds Grove	No 82(SM) Squadron
Tuddenham	No 107(SM) Squadron
Mepal	No 113(SM) Squadron
North Pickenham	No 220(SM) Squadron
Airhead: Lakenheath	

Hemswell (No 1 Group, main base)	**No 97(SM) Squadron**
Bardney	No 106(SM) Squadron
Caistor	No 269(SM) Squadron
Coleby Grange	No 142(SM) Squadron
Ludford Magna	No 104(SM) Squadron
Airhead: Scampton	

Driffield (No 1 Group, main base)	**No 98(SM) Squadron**
Catfoss	No 226(SM) Squadron
Carnaby	No 150(SM) Squadron
Breighton	No 240(SM) Squadron
Full Sutton	No 102(SM) Squadron
Airhead: Leconfield	

North Luffenham (No 3 Group, main base)	**No 144(SM) Squadron**
Harrington	No 218(SM) Squadron
Polebrook	No 130(SM) Squadron
Melton Mowbray	No 254(SM) Squadron
Folkingham	No 223(SM) Squadron
Airhead: Cottesmore	

The central concept of each of the main bases having four satellites was intended to ease the logistical burden and ensure, as far as possible, that an incoming Soviet missile strike might only affect — a euphemistic term for 'destroy' — the one base and its missiles. In general, each satellite station was within a 20-mile radius of the main base. That said, everything at a Thor site was situated above ground, and thus impossible to disguise or hide from enemy view. Or, indeed, from 'ban the bomb' anti-atomic weaponry marchers, who — as detailed on page 53 — would make regular active protests at the sites against what they saw as an escalation of the nuclear weaponry presence in the UK.

Virtually every piece of equipment on a Thor site was American in design and manufacture, transported across the Atlantic in a massive airlift by MATS transports to one of the airheads, then by road to the site. To maintain the tight timescale towards getting Thor operational in the UK, there was no real attempt to replace American items with others of British origin, although there were a few exceptions. While the transporter/erector for the missile was intended to be towed by an International Harvester M52 tractor truck, this was supplanted by a UK-built Leyland Hippo as a token gesture.

As installed in the UK, the Thor system was totally un-hardened and very much 'single-use': 60 missiles and 60 launch emplacements. Had war broken out and the missiles been launched, the launch emplacements would have been rendered unusable by the rocket blast — and, anyway, there was no stock of 'spare' missiles. Realistically, the 20 airfields housing a Thor squadron would have been prime targets for a Soviet missile strike, by which point Thor would anyway have failed in its deterrent effect. An LCO of my acquaintance once told me, "One of my blokes asked me, 'If ever we do have to launch our missiles, sir, what should I do afterwards?' I asked him where he lived. 'Not far away, in the village,' he said. 'In that case,' I told him, 'you might as well go home to your family.'"

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Each site had a launch control area (LCA), a triangular-shaped concreted area typically situated near the entrance to the site and at least 200m from the closest missile. There were no permanent buildings on it; rather, it was home to the trailer-mounted LCT and a 5,000-gallon diesel storage tank. The latter was on a cradle of concrete supports with a surrounding low concrete wall to contain spills.

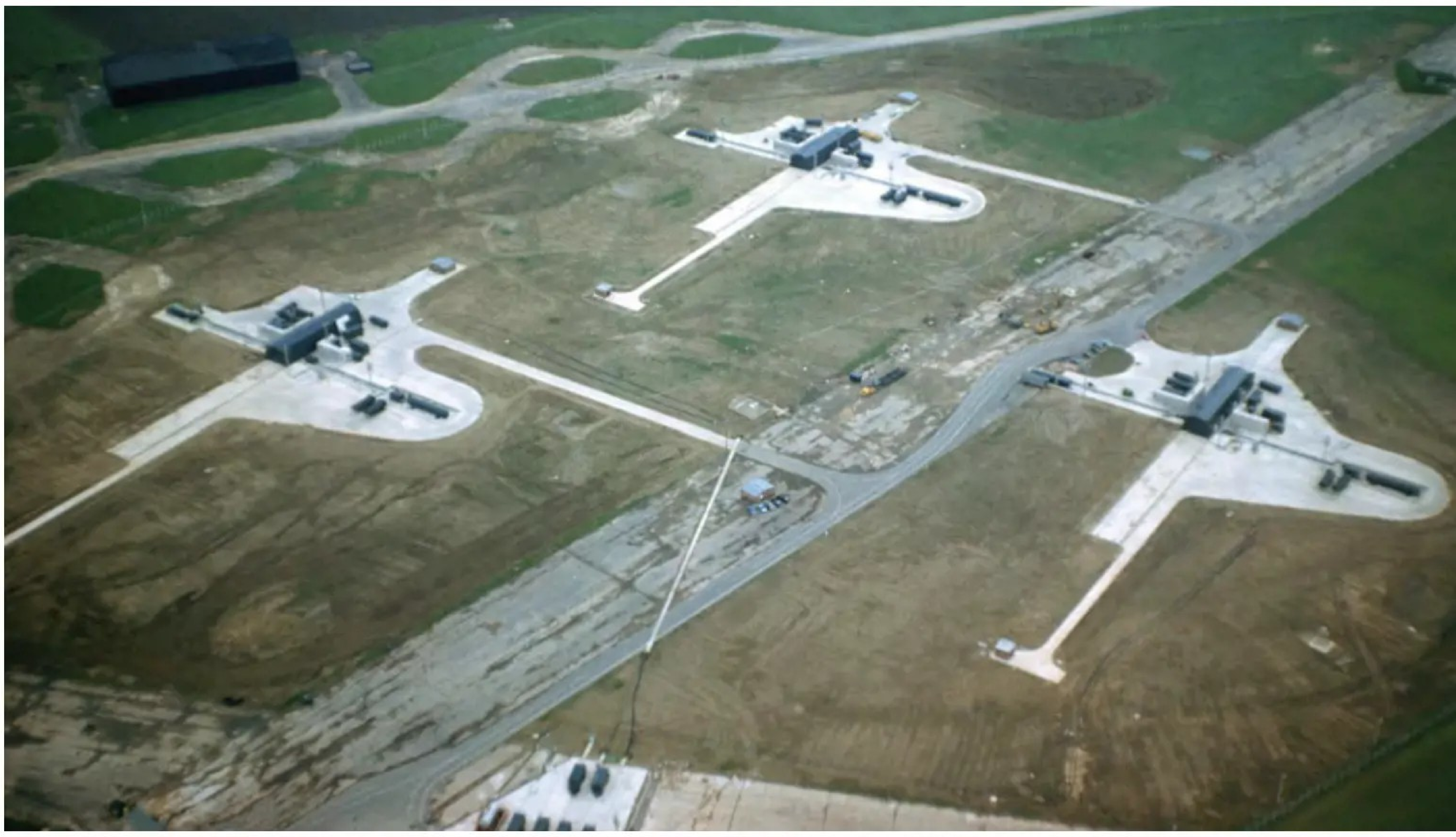
Crew training for RAF personnel was initially carried out in the States with Douglas Aircraft at Davis-Monthan AFB, Arizona, and at Vandenberg AFB, California, first courses beginning by early summer 1958. These were initially hampered by a lack of equipment and course material, while several early RAF attendees recall returning to the UK, only to be posted to an RAF Thor squadron at a base where building work was still under way and delivery of the missiles some way off.

The first Thor for the RAF was delivered to Lakenheath by C-124 on 29 August 1958. Further missiles and equipment for the Feltwell wing alone involved another 300 Globemaster flights. Construction of the site at Feltwell with its three emplacements — one of which housed what was considered a training missile for the based Bomber Command Strategic Missile School — was complete by August 1958, following which Douglas started installing the launch equipment. No 77(SM) Squadron formed at the base on 1 September 1958, to receive its first Thor later that month. Four squadrons, one at each of Feltwell's satellites, were established on 22 July 1959, at which point 77's UE was reduced to three missiles. By the spring of 1960, all 20 SM squadrons had formed and received their missiles.

The nominal RAF establishment of Thors was 60. Each missile wore a serial number, 01 to 60, which tied in with its emplacement number. Thus the three Feltwell missiles carried 01, 02 and 03, while Melton Mowbray had 55, 56 and 57. However, as missiles were pulled for a combat training launch (CTL) or moved for servicing, this system broke down to some extent. New missiles were delivered from the US as replacements, bearing a three-digit Douglas production serial. Thor 214, itself a later delivery to the UK, was used in CTL-10, carried out at Vandenberg by Hemswell's No 97(SM) Squadron. To paraphrase Henry Ford, a Thor came in any colour as long as it was white, the only visible markings being the serial and the politically important — for 'an RAF missile' — RAF roundel. Some, but certainly not all, units additionally adorned their missiles with the squadron badge.

> ***"The Thor system was un-hardened and very much 'single-use'"***

Preparations for the launch, the countdown and the launch itself were controlled from the LCT, which housed the consoles and seats for the LCO, his 'number two,' the guidance officer, and three technicians/launch control console operators, one for each missile: a launch team of five. All but one of the personnel involved in the launch were RAF. The LCO, of flight lieutenant rank, was in overall charge and had the key which, when inserted and turned in his console, initiated the launch sequence. The agreement under which Thor was deployed to the UK provided that the missiles were under RAF control but the warheads were American-controlled and could only be



ABOVE: A glorious aerial shot of the Thor site at Mepal, taken from an Oakington-based RAF Vickers Varsity, undated but probably from summer 1959. It shows the three launch emplacements, the newly laid concrete, and the incorporation of an old wartime runway into a system of connecting roads between the emplacements. The three missile shelters are all in the closed position, so it cannot be stated with any certainty whether the missiles were in place at the time of the photo but, judging by the fact that the ground equipment seems all to be present, they probably were. MICHAEL LETTON

"Launch! Launch! Launch!" The launch control officer enters the LCT, while the three launch crew technicians take to their service-issue bicycles to race to 'their' missiles. BILL YOUNG

An RAF Fire Service Bedford fire truck at Shepherds Grove. The concrete of the launch emplacement is being washed down after a practice RP-1 load. BILL YOUNG released by the USAF AO, who had a second key which he had also to insert and turn at a later phase in the countdown.

This 'dual-key' system satisfied the politicians and was, at least in theory, a safeguard against an accidental or 'rogue' launching of a missile. Stories abound, though, of how these safeguards could be bypassed. Ken Wright, once a Thor LCO, recalls a group of American congressmen visiting an RAF Thor site. One of them asked what would happen if, during the launch sequence, the American officer was in the toilet or could not be found.

"Easy", was the reply. "You just have to press down hard where the key goes, and it shorts out". This caused "one hell of a panic", resulting in a rapid rethink of the security of the system and modifications to the keys across the Thor force.

As built, accommodation for the launch crews proved somewhat inadequate. The squadron headquarters building, which was alongside the main gate entrance to the site, provided the guardroom, the boss's office, the adjutant's office, a bunk room, dining room and kitchen in Type B temporary hutting. The problem was that the building was some distance from the LCT and a couple of hundred yards from the launch emplacements. As Pete Wallington, an LCO on No 254(SM) Squadron at Melton Mowbray, recalls, "When the hooter went, it took time to get up there."

As a result, many sites built themselves a crew room next to the LCT. The RAF provided a base trailer on wheels, onto which was built a shed structure with a crew room and corridor which attached to the front door of the LCT. It was very much, as Pete says, "all DIY stuff", but it afforded seating and mattresses for the launch crew, who were constantly listening for direction from the bomber controller at HQ Bomber Command at High Wycombe. The 'bomber box' in the LCT had a loudspeaker, through which the controller's 'disembodied voice' gave his commands. All such communications and commands were by voice; this was long before the computer age.

"Once launched, a Thor was committed to its target"

Pete continues, "When the hooter went, my three technicians went off to their individual missile. Each guy had his own numbered missile; they didn't swap around. From the LCT, they ran across the pad to the MCOT. This was the system that monitored all the inputs to the missile, the monitoring being done by the technician — there was one MCOT per missile. There, they could see the whole start-up and check everything was OK. So, my technicians were sitting in the MCOT until the end of phase two. Then, at that point they came back to the LCT, where we were safer from the blast of the rocket exhaust, if things went any further. Once you went into phase three of the launch, everything was automatic. We had nobody near the missiles because we were loading LOX and RP-1; those two mixed together were lethal."

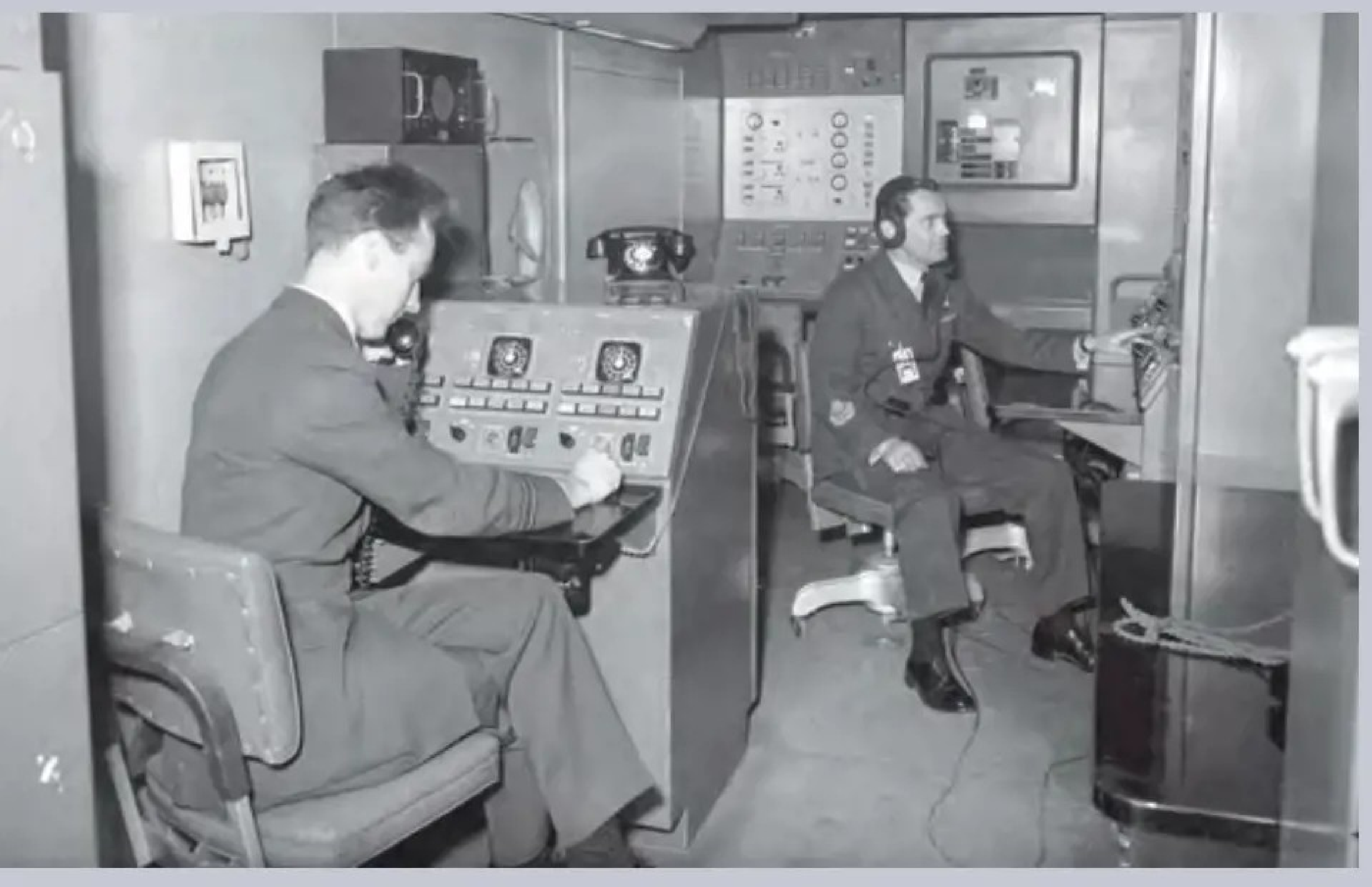
The launch crews were tasked with '15 minutes to launch' readiness. One drawback of the liquid-fuelled Thor system was that, once the missile had been fuelled, there was a limited time for which it could be held at that state. Pete says, "We could hold the countdown at the end of phase two almost indefinitely, or again at the end of phase three for a matter of hours depending on the rate of LOX burn-off, but finally at the end of phase four only for three minutes. This was because the guidance platform was disconnected from the theodolite control at the end of phase four and therefore could lose accuracy and stability. Once you were waiting for the American AO to turn his key, you were talking in minutes, not hours.

"If, at that point, the missile wasn't launched, you'd have to defuel and start over again. This was a big job because it all had to be reverse-pressurised. On fuelling, the RP-1 was all pumped in under CO2 pressure, 3,000psi, which blew the fuel from the storage tanks, through the lines and into the missile. To defuel, we had to reverse the whole system. It was a long job, believe me."

Once launched, a Thor was committed to its target. There was no recall and no destruct mechanism. "When it's gone, it's gone."

To keep RAF Thors at constant readiness required a complex shift system and rotation of certain personnel from the main base to the satellites. Main bases — Feltwell, Hemswell, Driffield and North Luffenham — were organised much as any other RAF station with admin wing, engineering wing and operations wing, and a group captain as station commander. They had a receipt, inspection and maintenance (RIM) building, typically in a converted hangar, air-conditioned and housing parts storage as well as maintenance facilities.

To operate and to hold at readiness its three missiles, every squadron had

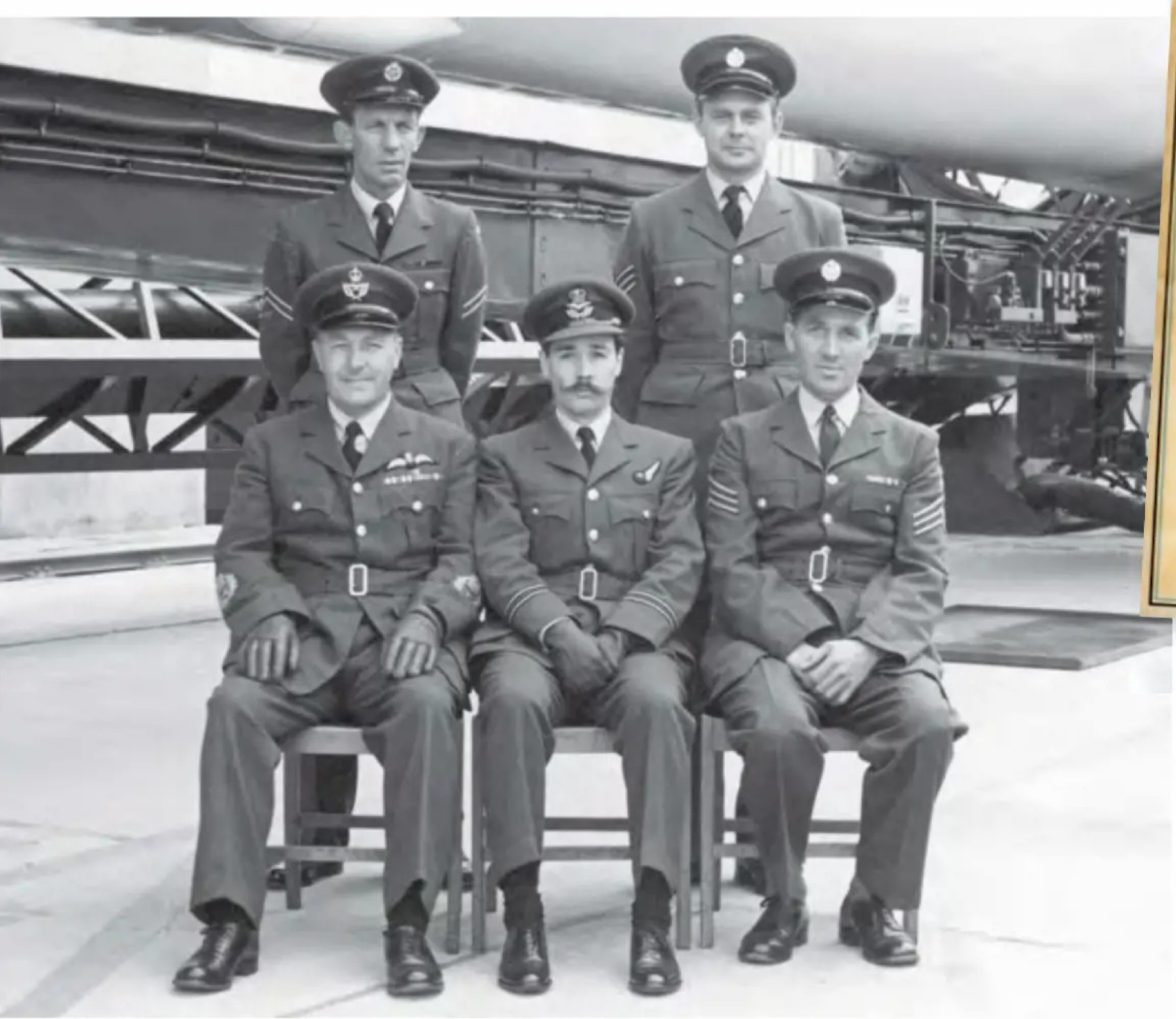


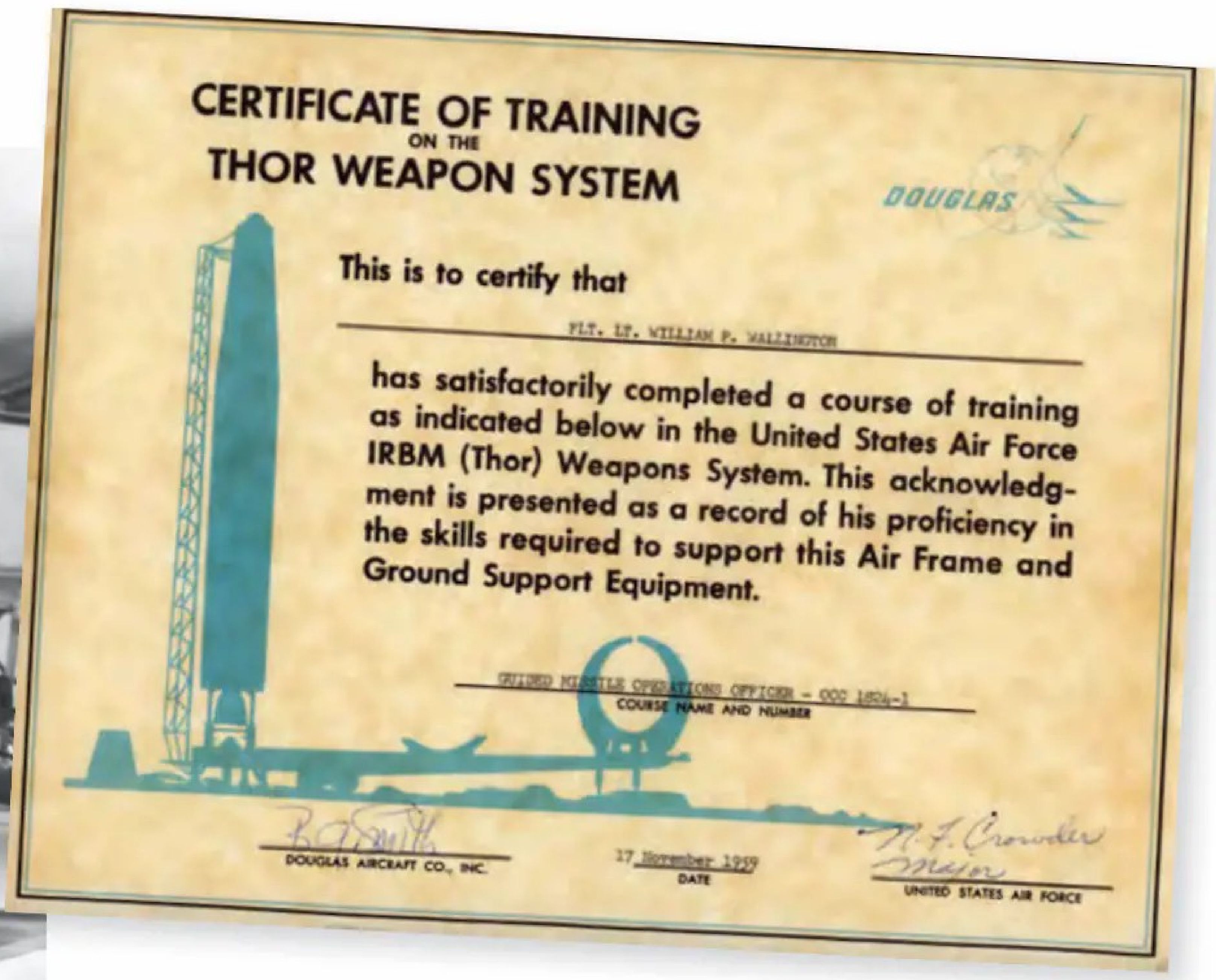
Inside the launch control trailer. At left, the LCO is seated at his console, which has three panels, one for each missile. His right hand is holding his launch key which he has inserted in the 'launch sequence' key slot. The American authentication officer had also to insert his key into the upper key slot and turn it from 'peace' to 'war' to enable the launch. On the wall, above the LCO's head, is the black 'Bomber Command Box'.
AEROPLANE

LAUNCHING THOR

The launch sequence — in simplified form — comprised five phases, starting with the missile horizontal in its environmental shelter. The countdown was initiated by the LCO inserting and turning his key in the launch control console. This console had three panels, one for each missile and each with a key slot marked 'launch sequence'.

Phase 1	Systems powered up, INS aligned
Phase 2	Shelter rolled back, missile raised to vertical, guidance system fully aligned; Phase 2 could be held for several hours
Phase 3	RP-1 and LOX loaded; transporter/erector lowered
Phase 4	Target selection checked; AO turns his key from 'peace' to 'war'
Phase 5	LOX topped up to 100 per cent; RP-1 and LOX tanks pressurised; engine ignition; lift-off





CERTIFICATE OF TRAINING
ON THE
THOR WEAPON SYSTEM

This is to certify that

FLT. LT. WILLIAM P. WALLINGTON

has satisfactorily completed a course of training as indicated below in the United States Air Force IRBM (Thor) Weapons System. This acknowledgment is presented as a record of his proficiency in the skills required to support this Air Frame and Ground Support Equipment.

GUIDED MISSILE OPERATIONS OFFICER - OCC 1824-1
COURSE NAME AND NUMBER

DOUGLAS AIRCRAFT CO., INC.

17 November 1959
DATE

N. F. Crowder
Major
UNITED STATES AIR FORCE

LEFT: Pete Wallington with his launch crew in front of a No 254(SM) Squadron Thor at Melton Mowbray in August 1960. Back row: left Doug Chatfield, right Eddie Baron. Front row: left Dougie Howarth, centre Pete Wallington, right Jock Gibson. PETE WALLINGTON COLLECTION

INSET: The 'Certificate of Training on the Thor Weapon System', duly signed on behalf of the Douglas Aircraft Company and the USAF. This example was awarded to Flt Lt William P. Wallington on having completed his guided missile operations officer course at Douglas's Tucson plant in November 1959. PETE WALLINGTON

a personnel strength of just 26, with a squadron leader as 'boss' and five launch crews of five persons each, who maintained the around-the-clock alert. They worked eight-hour shifts, one being on duty and a second on call as back-up. For this punishing routine, they were given 10 weeks' leave per year. A sergeant policeman and at least three others patrolled the site, with a police dog at night, plus a fireman and a cook, all rotated from the main base and working shifts. An American AO, with his own three keys on a lanyard around his neck, was available at all times as the necessary final link in the launch sequence.

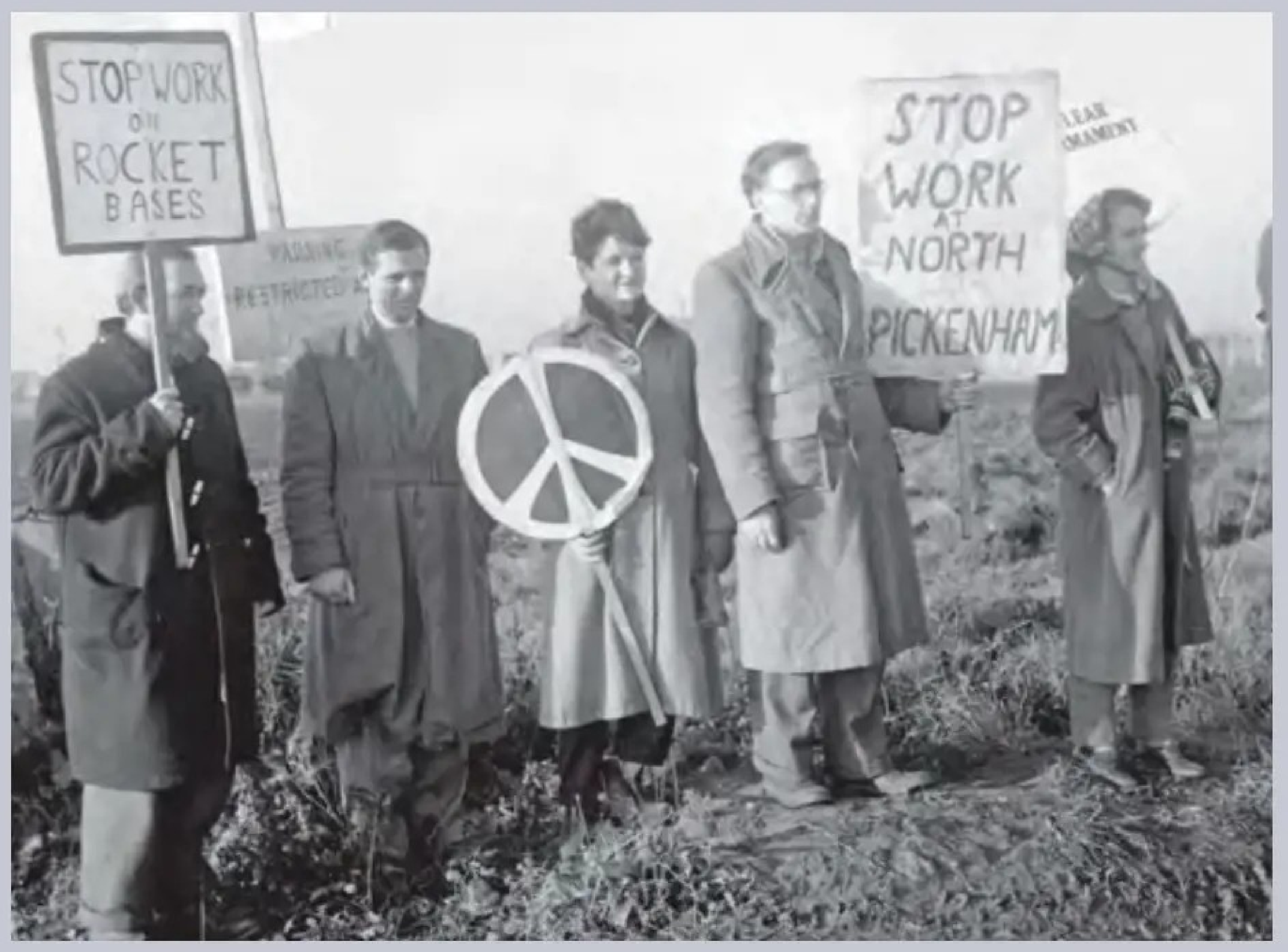
The first operational launch — with a USAF launch crew — took place from Vandenberg on 16 December 1958. RAF launches at Vandenberg commenced on 16 April 1959, involving student RAF crews in the final stage of their integrated weapons system training. For many RAF personnel, an IWST would be the first and only Thor launch they would ever experience. Later, as Thor squadrons became

BAN THE BOMB

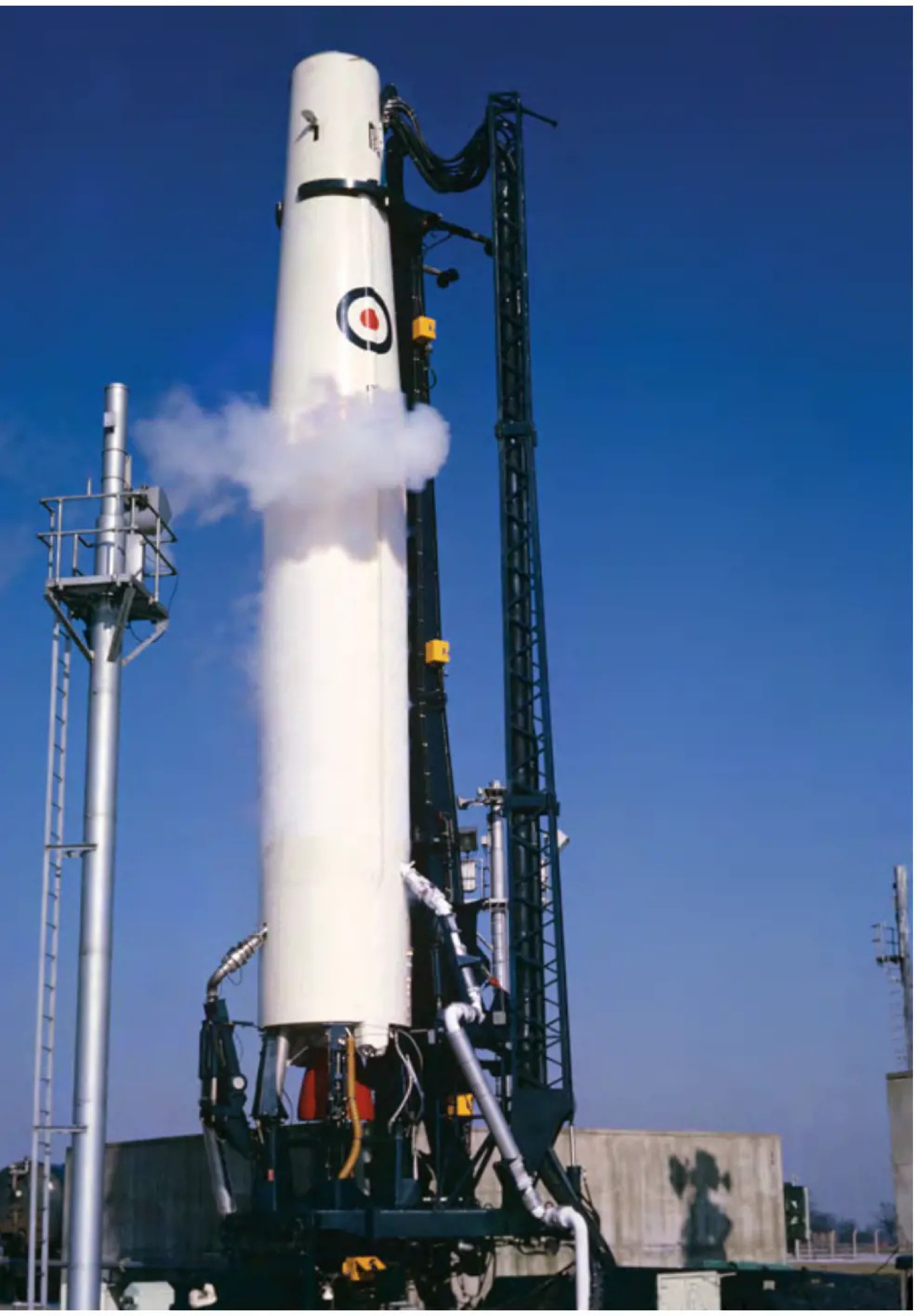
A satellite Thor site established on a previously disused RAF airfield would typically occupy only a small part of the original area. The 'new' site had an outer perimeter of barbed wire coils, within which was a sterile area 75 yards wide, then an 8ft galvanised fence with concrete posts, topped with three strands of barbed wire. RAF police with dogs patrolled the area. There was a single point of entry, which was well-lit by night. To ensure personnel stayed ever-alert to the possibility of intrusions, either by hostile elements or anti-nuclear protesters, attempts to breach security and gain entry were made by the RAF Regiment or personnel from other Thor squadrons.

Pete Wallington, on duty at Melton Mowbray, recalls the time he was tipped off that a 'Ban the Bomb' march was heading his way. The protesters arrived outside the site and managed to break through the outer barbed wire, crossed the sterile area and started to climb the fence. What to do? Pete started by asking them, politely, if they would remove themselves, but to no effect. He then decided to use the station Tannoy to announce very clearly there was to be a practice fire alert — "Practice fire, practice fire, practice fire" — and had the fireman start up the Rolls-Royce airfield fire engine. The protesters did not back down, so they were blown off the fence by 5,000 gallons from the fire engine's water cannon. They retreated.

The next day, perhaps inevitably, he received a 'phone call from the station commander at the North Luffenham main base. "I've had a complaint that you used your water hose on some innocent protesters", he said. Pete replied, "No, sir, I didn't. I had a fire practice. My Tannoy clearly announced it. They just happened to be in the way". The station commander, a pragmatic fellow, replied, "Thank you very much", and that was the end of that.


STOP WORK ON ROCKET BASES
PASSING RESTRICTED
STOP WORK AT NORTH PICKENHAM

Demonstrators outside the Thor base at North Pickenham, Norfolk, where protesters climbed the barbed wire by laying their banners on it and attempted to prevent builders working on the site, as well as lying down in front of the gate whenever a lorry appeared. GETTY



ABOVE: A practice Thor liquid oxygen loading at Shepherds Grove by No 82(SM) Squadron: the clamshell arms are still locked around the missile's nose and LOX is venting/ boiling off. BILL YOUNG

operational in the UK, a series of CTLs were scheduled at Vandenberg involving RAF launch crews, these being designated CTL-1 upwards, and each given an unlikely codename such as 'Center Board' or 'Shepherds Bush'. While CTL-1 to CTL-3 used Thors from American stocks, CTL-4 onwards employed RAF missiles from the UK.

In order better to evaluate the RAF operation, for a CTL the missile and its launch crew would be selected randomly from within the 20 RAF squadrons. Then, the missile, along with its accompanying personnel — the CTL detachment — was transported by the USAF to Vandenberg, where it would be fired over the Pacific missile range. While the initial agreement was for eight CTLs to take place a year, this figure was reduced to four for UK budgetary reasons in December 1959. A total of 12 eventually took place, the last on 19 June 1962. Of these, all but CTL-11 were deemed successful, which engendered confidence that, had it been called upon in time of tension or war, the Thor system would work as designed.

The Thors were kept at a state of readiness that might today be described as '24 x 7 x 365', even if that (dreadful) phrase had yet to come into common use. By December 1959, the missiles of the Feltwell wing were in place and a government announcement on the 9th of the month declared the Thor system as having joined "the operational front line of the Royal Air Force". All was not as it seemed, though, as newspaper reports emerged that the UK and the US were not agreed on the state of readiness achieved and suggesting no warheads were actually fitted to the Thors. Political discussions between the two governments continued into 1960, the American side exerting pressure to get the state of readiness it felt was needed, and which it was paying for. The situation was resolved by an agreement of 10 May 1960, after which the warheads were fitted. All 20 Thor sites were complete as of summer 1960 and had missiles in place with warheads attached. The Thor force finally had a no-notice strike capability. The intent was that 60 per cent of the missiles would be at 'stand-by' or 'available' at all times, with the aim of increasing this to 75 per cent as the system settled in. Even at 60 per cent — 36 missiles available — the Thor force provided a very significant proportion of the RAF's nuclear delivery capability alongside its 'V-bomber' force. More to the point, had war broken out, the first nuclear weapons to reach their targets in enemy territory would have been delivered by Thor.

> *"The decision to launch, or not, had to be taken in a very short time"*

The Cuban missile crisis of October 1962 brought the Thor force to its highest alert state, in parallel with Bomber Command's 'V-force', and it is said 59 of the UK's 60 missiles were serviceable and at readiness. Those held at phase two — shelter rolled back, missile erect — could be launched in eight minutes, and those at a later phase in even less. However, once a missile had been fuelled with RP-1 and LOX (phase three), the decision to launch, or not, had to be taken within a very short time. Bomber Command planners had to balance the desire to have as many as possible of the missiles at high readiness against the need to maintain that status for a period possibly of several days. As history records, diplomatic negotiations defused the situation, and the Thor force returned to a more normal state of readiness.

Perhaps unfairly, published sources often downplay the significance of the RAF's Thors in the Cuban missile crisis. The accord reached between Kennedy and Khrushchev — British Prime Minister Macmillan was kept in the loop of discussions, but was not a major player — included an agreement that the US would remove its Jupiter IRBMs from Turkey, although this was not made public at the time. The Thor force was no longer a bargaining chip as, just two months earlier in August 1962, it had been announced that the US-UK agreement that had brought it into existence would be ended in 1963 and all missiles returned to the US. The reasoning was that Thor's operation was costly, the sites were not hardened against enemy attack and the system had no second-strike capability.

As a result, withdrawal of Thors from UK sites got under way early in 1963, the Driffield complex being declared non-operational on 1 April, to be followed by Hemswell, Feltwell and North Luffenham. Thus, the whole force had been run down by the end of September 1963. The 20 strategic missile squadrons were disbanded, the sites stripped of usable equipment and, in almost every case, the airfields abandoned. The missiles, along with the warheads and other sensitive or high-value equipment, were flown back to the US by MATS transport, where they would be refurbished by Douglas before having a second career as space launchers.

In the space of little more than five years Thor, the world's first operational IRBM, had come to Britain, held the highest state of alert and provided a significant part of the UK's deterrent force, before disappearing almost without trace.

Thanks to the many 'Thor men' and their descendants who shared their recollections, in particular Bob Broad, Bill Brookes, B. J. Fry, Michael Letton, Rodney Robinson, Pete Wallington, Bernie Worsfold, Ken Wright and Bill Young.

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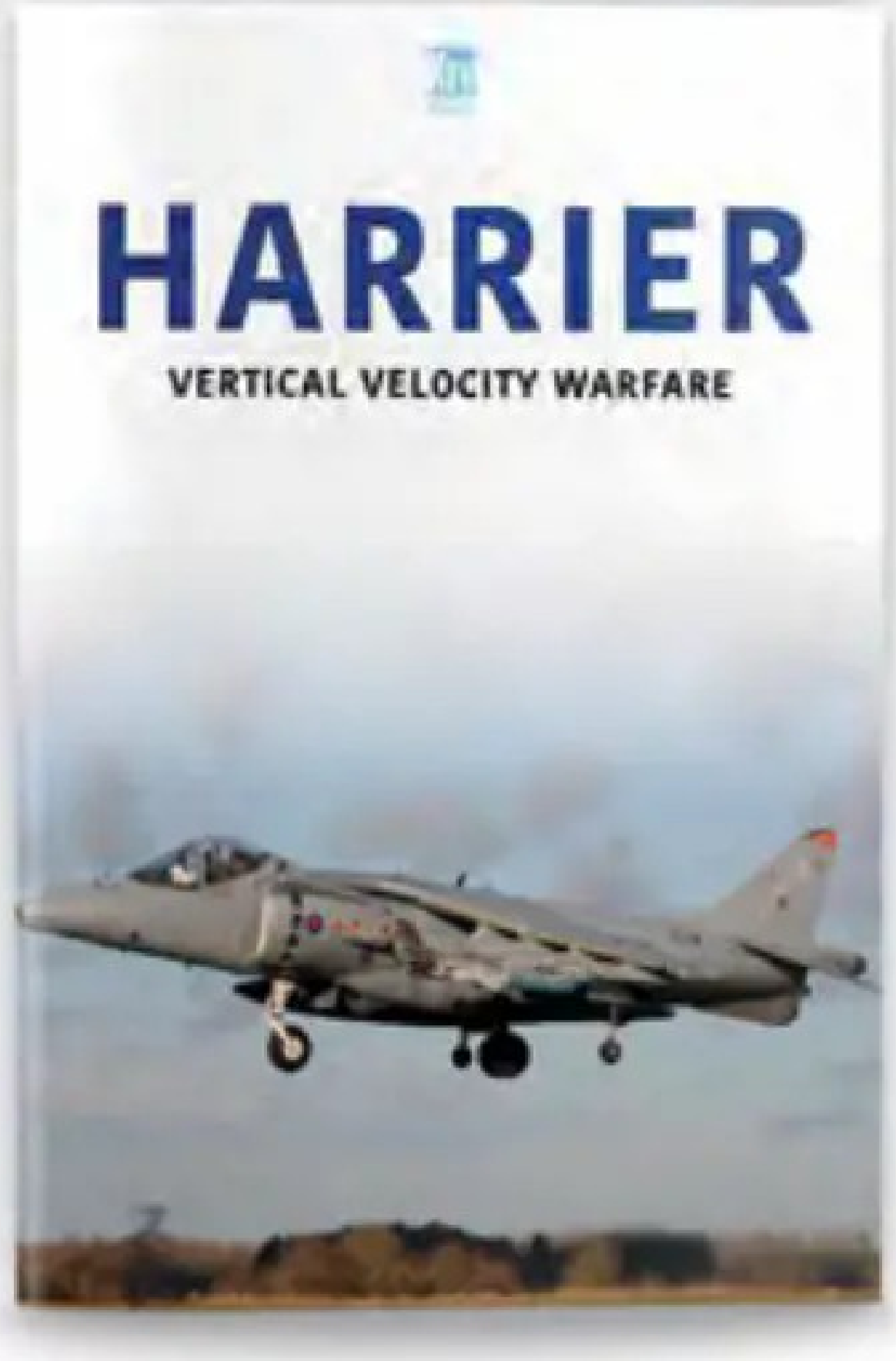

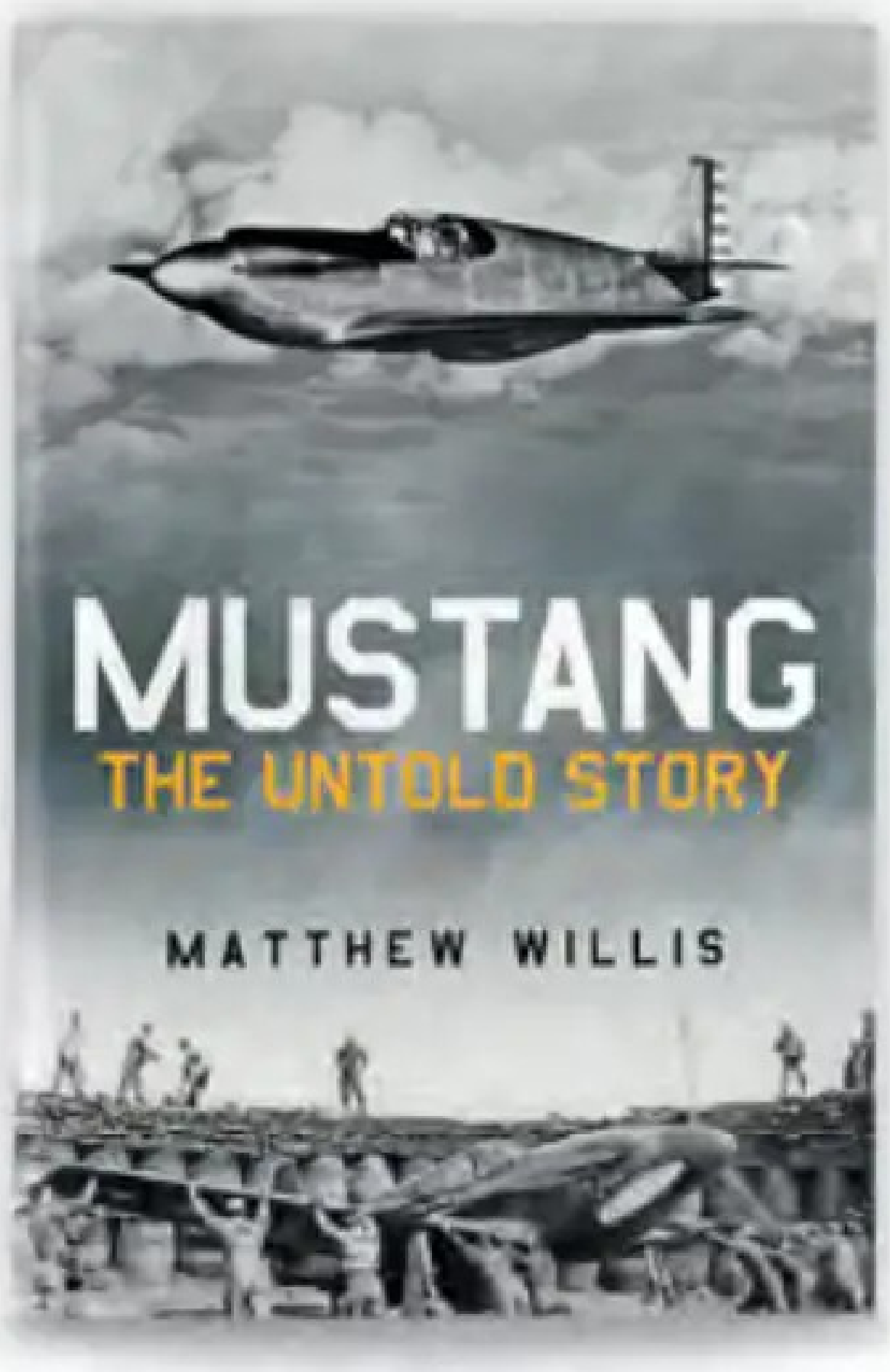

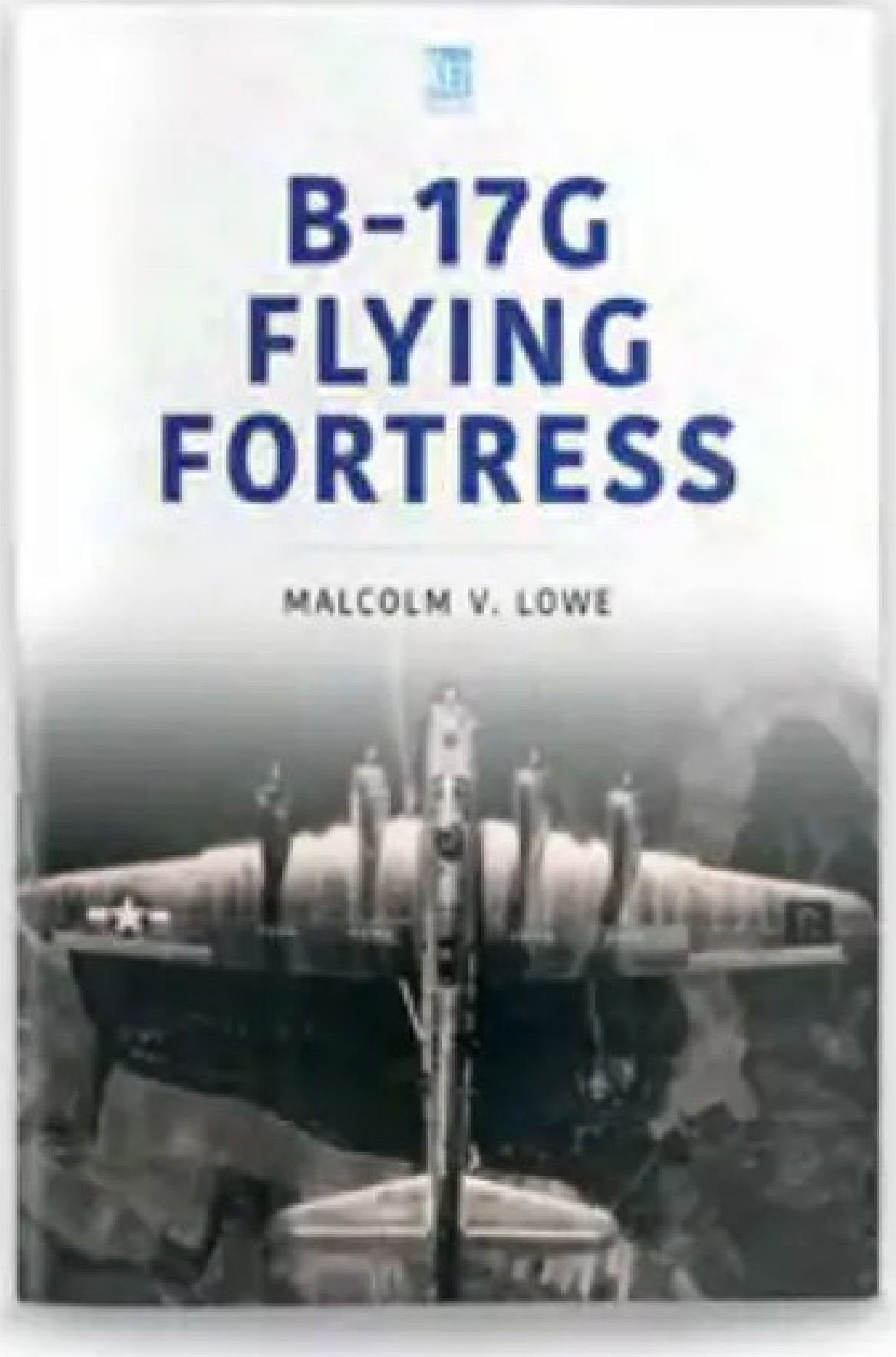

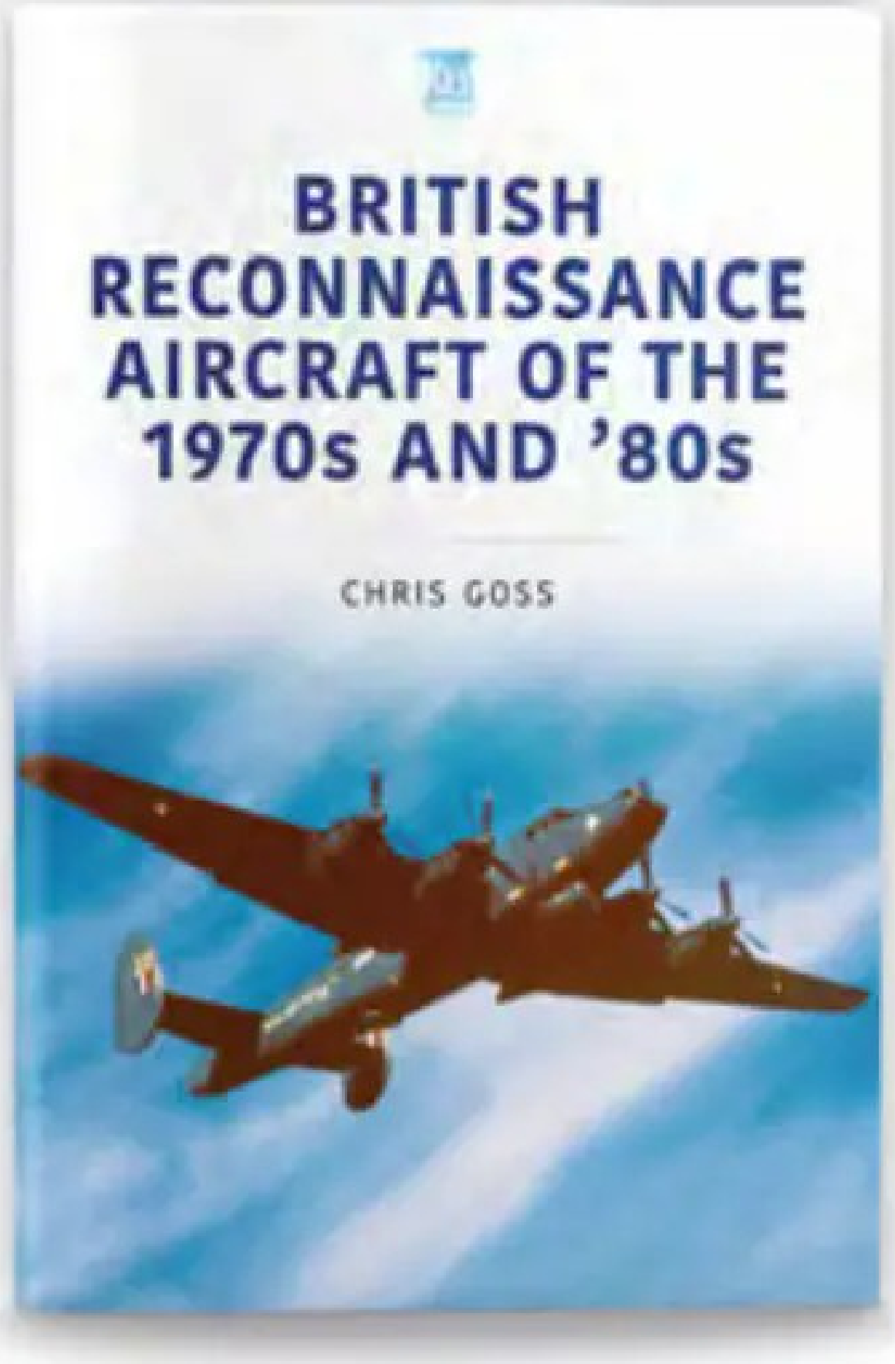

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SPECIAL RELATIONSHIP

It is now half a century since the first visit by a Lockheed SR-71 to UK shores, and the start of a link between Britain and 'Blackbird' that came almost to define the height of the Anglo-American bond. But the road to US Air Force SR-71 operations from Mildenhall was not always a smooth one **WORDS:** BEN DUNNELL

Just two years earlier, it wouldn't have been allowed. Well, almost. A US Air Force Lockheed SR-71A could still have set a speed record between New York and London, but ending the flight in a blaze of publicity at the Farnborough show: no way. Not British enough, you see. Even after a recent relaxation, the Society of British Aerospace Companies' myopic insistence that aircraft participating in its biennial 'shop window' have substantial UK content would have kept this most spectacular exhibit out. But in 1974, finally Farnborough went fully international, so 'Kelly' Johnson's unmistakeable shape settled onto the Hampshire aerodrome's wet tarmac, and entered the history books.

This was more than just a record flight for the sake of it. When pilot Maj James V. Sullivan and reconnaissance systems operator Maj Noel F. Widdifield touched down in SR-71A serial 61-7972 that September Sunday afternoon, they were completing what, for them, was a fairly standard sortie. In a sense, it was a belated one, for the 'Habu' — as the aircraft had been dubbed by locals in Okinawa when it was deployed to Kadena AB on the Japanese island — should have been seen on UK soil the previous year. But it was also an obvious precursor to a more regular presence, especially when '972 proceeded from Farnborough to RAF Mildenhall prior to heading home, and another record.

The broader background really begins in December 1971. Prime Minister Edward Heath was shortly to travel to Bermuda for talks with US President Richard Nixon, at which they were to have a wide-ranging discussion of the world situation. Just a few days earlier, the Foreign Office received a request from the Americans which demanded Heath's attention. They had, a memorandum to Heath by an unnamed Foreign Office minister outlined, asked for "occasional use of their base at RAF Mildenhall" by SR-71s engaged in reconnaissance operations. "As instances of its possible use the Americans have mentioned: monitoring an Arab-Israeli cease-fire; undertaking urgent reconnaissance during an Eastern European crisis. (They probably have in mind a possible Soviet invasion of Yugoslavia or Romania.) Although they have not said so, overflights of foreign territory could include the Soviet Union itself."

As described by type expert Paul Crickmore in the latest edition of his book *Lockheed Blackbird: Beyond the Secret Missions* (Osprey, 2024), Strategic Air Command's original April 1970 plan for SR-71 operations in Europe had involved a detachment at Torrejón AB, Spain. But the Spanish government refused, so Washington turned to London. It was stated there was no desire to base SR-71s permanently in Britain, "and they accept that the aircraft would not be deployed here or used on operations without our specific agreement on each occasion. They would make available to us all the intelligence gained". Each deployment would involve two SR-71s from the 9th Strategic Reconnaissance Wing at Beale AFB, California, plus their supporting KC-135Q Stratotanker air-to-air refuelling aircraft, while only "small and inconspicuous works" would be needed at Mildenhall to support the aircraft, these paid for by the Americans.

> ***"The Americans asked for occasional use of Mildenhall by SR-71s"***

But the Foreign Office could see potential pitfalls. Memories of the need to conceal the nature of previous U-2 detachments to Britain may well still have loomed large, even if they had at the time been 'black world' Central Intelligence Agency affairs, whereas the SR-71 was a publicly acknowledged USAF asset. "It is possible", the memo said, that the presence of SR-71s at Mildenhall "would sooner or later become public knowledge", leading to "Parliamentary and press interest, and probably some speculation about the role of the aircraft in view of its known capabilities and the analogy of the U-2."

More seriously, "There could be serious diplomatic difficulties if the aircraft were detected, or even engaged, during overflights of foreign territory and it became apparent that they were operating from the UK. For example, the

LEFT: A very wet Farnborough welcomed Maj Jim Sullivan, Maj Noel Widdifield and SR-71A 61-7972 on 1 September 1974.
CROWN COPYRIGHT

ABOVE: Among those who greeted Sullivan (left) and Widdifield (centre) as they descended the SR-71's steps was 15th Air Force commander Lt Gen William Pitts. VIA NOEL WIDDIFIELD

Egyptians could well object to flights over the Suez Canal area but the Americans might nevertheless wish to proceed. If the fact that such flights were being mounted from British bases then leaked out, this could involve us in a major row with the Egyptians and we might have to ask the Americans to desist. Our difficulties with the Egyptians could be exacerbated if the Americans were to transmit the results of these flights to the Israelis. Problems could similarly arise in connexion with any flights over Warsaw Pact territory, especially over the Soviet Union… Its operation from a UK base, with the use of British airspace, might not be easy for the countries concerned to substantiate, but the possibility cannot be ruled out, especially if the presence of SR-71 aircraft here has become public knowledge". Quite how it was proposed to operate SR-71s from Britain without the public being aware is open to speculation.

The 'top secret' document went on, "We can clearly give no advance assurance to the Americans that we would agree to operations (or even necessarily to a precautionary deployment) on each and every occasion; it is possible that there would be some occasions on which we should want to say no. Acceptance of the present American proposal would thus expose us to the possibility of tension between Governments on some future occasions; it would equally expose the Americans to the risk of being unable to undertake operations to which they attached importance and for which they had been counting on Mildenhall. As against these potential difficulties, there is the strong argument that our long-standing co-operation with the Americans in intelligence matters gives us access to a great deal of information which we have no other means of obtaining and that rejection of the American proposal would carry some risk of reducing this co-operation in the future (especially if there is any current disposition in the US Administration to believe that our entry into Europe may herald some weakening in Anglo-American collaborative arrangements generally). It is also likely that we should see strong advantages to ourselves and NATO in some of the operations which the Americans would wish to conduct with SR-71 aircraft based in the UK."

◆

On balance, it was thought any problems with public or press attention could easily be dealt with, while the Foreign Office felt, "on balance, the risks of embarrassment should be taken, having in mind the importance which the Americans themselves attach to this proposal, the general desirability of maintaining our intelligence co-operation with them, and the Ministry of Defence's belief that SR-71 reconnaissance operations of the kind the Americans have in mind could well be of value to ourselves and NATO on some occasions". The recommendation, therefore, was to "agree to the American request, on the clear understanding that no SR-71 aircraft will be deployed here, and no individual SR-71 missions will be flown from a British base, without our prior agreement."

Heath concurred, and the Americans were duly informed. But not until the Arab-Israeli Yom Kippur war of October 1973 was a request

RIGHT: Facing the press, the two SR-71 crew members were accompanied by their wives, who had flown out to the UK — at their own expense — in advance. It was Ann Widdifield who set the wheels in motion for a flight in Concorde G-AXDN during Farnborough week. VIA NOEL WIDDIFIELD made for British SR-71 basing. A US Joint Chiefs of Staff memo dated 8 October outlined the "immediate requirement" for intelligence on "military targets in Syria and Egypt", with "military dispositions and surface-to-air missile (SAM) sites in Egypt along the Suez Canal and in Syria near the Golan Heights" being afforded highest priority. The document is still heavily redacted to obscure any mention of the country and location involved, but the Joint Chiefs proposed the "immediate deployment" of an SR-71 to Mildenhall in order to provide, "Off shore peripheral coverage of targets in Syria and Egypt, including ports, coastal airfields and combat operations in the Sinai within 20 miles of the coast", and "Overhead coverage of all important target areas".

Lt Col James H. Shelton Jr and his RSO Maj Gary L. Coleman were the crew. "The reason the SR-71 got alerted in the October timeframe", Shelton recalled to the author in 2013, "was the fact that, during that war, the Russians were supporting the Egyptians, and of course we were very supportive of the Israelis. The Russians were launching satellites to find out where the battle lines were and what was happening in the war, but we couldn't take any of our satellites out of their Russian orbit because of the priority we attached to that area. It was asked whether the SR-71 could cover the Middle East. Well, naturally it could, but the original plan was to fly from Beale AFB in California through the Middle East and recover to RAF Mildenhall in England. It was going to be an eight-and-a-half-hour mission.

"We went down for the briefing on 10 October 1973, and in the meantime the maintenance recovery team was on board a tanker heading towards England. When the tanker landed, the British said, 'You cannot land the SR-71 here'. The argument was that Britain relied too heavily on Middle East oil and didn't want to be accused of supporting any sort of mission like that. So, they cancelled the mission. Gary and I went home. We came in the next morning, and they said, 'We've got a new plan'. Now we would fly from Griffiss AFB, New York, through to the Middle East and recover back to Griffiss". And that, on 13 October, was what Shelton and Coleman did. In 61-7979, they spent 11 hours 13 minutes in the air, a new SR-71 record, with 13 KC-135Qs in support.

ABOVE: Lockheed dominated Farnborough in 1974, the SR-71 being corralled with a C-5A Galaxy and, just visible at the top, a P-3C Orion.
VIA NOEL WIDDIFIELD

But the recollection of Britain's position, coming as it does from an American perspective, understandably repeats a misconception held in Washington. This was that the UK objected to the SR-71 sortie being flown from its soil. In fact, it merely had reservations, which were wrongly interpreted — and have been portrayed in some accounts — as a refusal.

> *"The UK merely had reservations about the SR-71 sortie"*

In a letter to Foreign Secretary Alec Douglas-Home, the British ambassador to Washington, Lord Cromer, noted a subsequent discussion he'd had with the US Defense Secretary, James Schlesinger. Cromer explained, "that we had (at considerable inconvenience to Ministers) gone out of our way to agree to the US request, subject to the usual reservation. Schlesinger replied that one of our reservations had been that material derived from the flight should not be passed to Israel. He was not sure this was either a standard or a helpful reservation. I replied that we had taken our policy of strict neutrality in the conflict very seriously. There would have been no conceivable advantage in risking a confrontation with the Arabs on this, had the information leaked out."

By late November 1973, the impasse had been ironed out. The Washington Special Actions Group was a task force of senior officials from across the US government and its agencies, set up and chaired by Secretary of State Henry Kissinger as a means of co-ordinating crisis responses. The minutes of its 9 November meeting on the Middle East include a discussion in which the possibility of landing an SR-71 in Greece was mooted, along with Iran. Deputy Defense Secretary William Clements said, "I don't think the Shah would let us", to which Joint Chiefs of Staff director of plans Admiral John P. Weinel replied, "Not even if we gave him an SR-71?" But on 29 November, Joint Chiefs chairman Admiral Thomas Moorer told Kissinger the JP-7 fuel used by the SR-71 would begin to arrive at Mildenhall from 1 January 1974. Kissinger added, "After January, we can fly out of the UK."

Even so, period reports describe the Anglo-American relationship as not then being at its height. A piece by Jack Anderson published in the *Washington Post* on 18 February described how President Richard Nixon had been weakened internationally by the burgeoning Watergate scandal, that Kissinger had frosty relations with Heath, Douglas-Home and Cromer, and that a British diplomat had described the US ambassador to London, Walter Annenberg, as "a disagreeable fool". "British sources", said Anderson, "also confirmed published reports that Kissinger angrily canceled a plan to fly SR-71 spy planes out of a base in England during the Middle East fighting. The stories claimed that Kissinger was angered by Heath's demand that British knowledge of the operation be kept strictly secret.

"According to our British sources, Heath merely insisted that the Israelis should not be shown the reconnaissance photos taken by the spy planes. In any event, Kissinger ordered the spy planes to bypass Britain, which resulted in costly mid-air refueling operations and delayed for three days some of the intelligence on Soviet deliveries to Egypt and Syria."

While denials came from both sides of the Atlantic, later accounts from within the British government support the assertion that it was Kissinger who decided not to fly the SR-71 from Mildenhall. James Callaghan, Foreign Secretary in the Labour government elected that year, wrote to Prime Minister Harold Wilson in November 1974, "in fact the Americans called off the flights, because of what they thought was 'the obvious deep concern in London,' and we subsequently heard from Dr Kissinger that he had felt that the United States could not use Mildenhall because our agreement had been given 'so grudgingly and reluctantly,' though this was not in fact the case."

> **"We actually could have made the flight without having to refuel"**

Was the UK visit in September 1974 specifically intended as a lead-in to regular SR-71 operations from Britain? Speaking nearly 50 years after the record flight he undertook with James Sullivan, Noel Widdifield says, "I had no insight into what was planned for the future. The decision had been made for us to display the airplane at Farnborough. As a result of that, Barry Goldwater [Arizona senator and a recently retired Air National Guard major general] had suggested to then-President Ford that we try to set a record, and things moved forward from that. As events eventually turned out, obviously that wasn't a bad deal, because that got us to England with the airplane and probably made it easier later on, but that's speculation on my part.

"Jim and I were the senior crew, crew SO-1 — chief of stanboard [the standards and evaluation board] and chief of the navigation branch together. We were told, I guess, about three to four months before the event that it was going to happen, and that we were the crew selected because we were the senior crew. That's the first we knew about it. But then nothing happened for quite a while. We deployed to Okinawa, came back; I took some vacation, and at some point about a month before the wing commander came to us and said, 'It's a go,' with us as the primary crew. But even before the wing commander talked to us, the local base paper there in California came out and my wife said, 'Hey, looks like you're gonna go!'

"First of all, it was a routine flight. It was no different than any other flight. Every single one of those required a considerable amount of time for planning. The route was planned and laid out by the navigation branch, which was a bunch of guys who did the mission planning. They developed all the documents needed, developed the program for the computer for the route, and worked to get FAA clearances through the United States and so on to make sure the route was approved ahead of time. The tankers had to be scheduled to meet us, because we needed tankers after take-off, just prior to arriving in New York, mid-way along and waiting for us in England in case we had a problem.

"It was a very early take-off. We flew night missions all the time, but it was still very early. The only thing we saw that was much different was that there was a little more activity as we got ready to fly — our suit-ups and so on. Our kids were able to come and watch us, and there were some other visitors..."

Once they were under way, "We accelerated through the Machs, up to Mach 3 at 80,000ft, and from there started on the route. We flew south over the southern part of the United States and up the east coast. All the route was programmed to

BELOW: The crew for the return flight: Capt Harold Adams (right) and Maj Bill Machorek. DENIS J. CALVERT

avoid populated areas. As we came towards New York, we told the tanker we were there and started our descent from 80,000ft down to 25,000ft. We took fuel and from there started our acceleration to cross over the 'gate' at New York. There were imaginary rings drawn around New York and London that we had to 'clip' in order to establish the distance. We climbed back to 80,000ft and made our way on.

"We actually could have made the flight without having to refuel, but we would have been below the minimums in case of an emergency in the London area. So, we had to descend for a tanker en route near Newfoundland. Same process: we descended down, hit the tanker, accelerated back up.

"After we got to 80,000ft, we were still not quite over the Atlantic when we had what was called an 'unstart' [a problem whereby, when the SR-71 was flying supersonically, the shockwave in the engine inlet throat could be rapidly ejected from the front of the inlet and the movable intake 'spike' on the Pratt & Whitney J58 would go into the subsonic position, suddenly stopping airflow and reducing thrust]. You knew which engine had unstarted when your head hit the windscreen on the opposite side of the cockpit… We didn't have any trouble restarting, and didn't really lose any altitude or speed. Then we continued on all the way to London.

"As we approached London, obviously we contacted air traffic control there. We came in, made our descent, did a flyby and landed at Farnborough after one hour 54 minutes and 56 seconds, to be exact. We taxied in to the place where we had to park, opened the cockpits and were greeted by our wing commander [Col Pat Halloran] and the FAI [Fédération Aéronautique Internationale] representative who then checked us to make sure we were the same people who'd got into the airplane at Beale. Kind of funny-sounding, but that had to be done! Climbing down the steps, we were greeted by several other people including our wives and 'Kelly' Johnson, who we were very happy to see."

◆

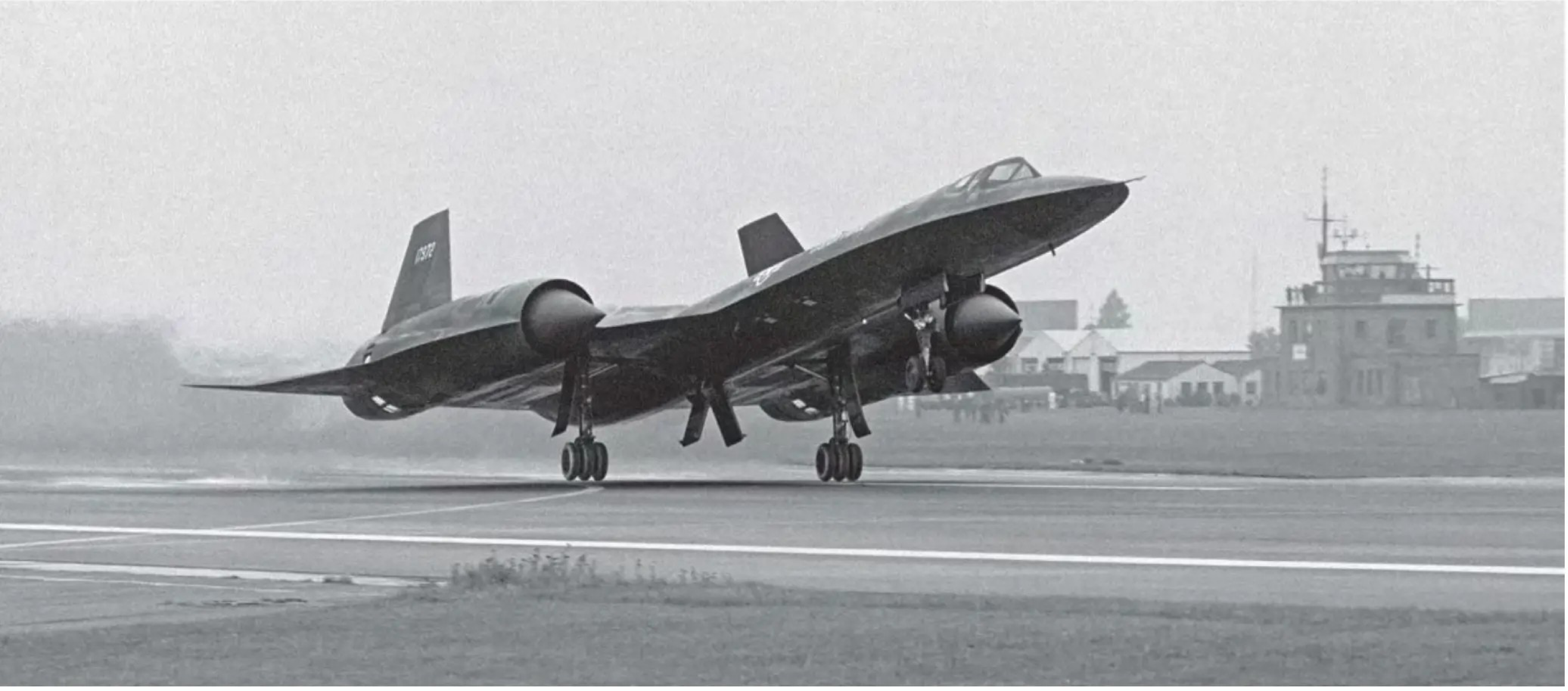
Johnson, the Lockheed 'Skunk Works' supremo and mastermind behind the SR-71, was just as happy to see them. "It has exceeded all my expectations", he said of the flight. Sullivan and Widdifield had set an average speed of 1,806.95mph for the 3,461.53 miles, and their time not just broke but smashed the previous New York-London record of four hours 46 minutes, set during 1969's *Daily Mail* Transatlantic Air Race by a Royal Navy Phantom FG1. It has never been bettered.

"Still in our pressure suits", continues Widdifield, "but with our helmets off, we were taken into a place where the media was gathered. They threw a lot of questions at us. At that time President Ford called us. He talked to Jim for about two or three minutes, and then talked to me for a couple of minutes. He wanted to know what my job was, because he didn't know what a reconnaissance systems officer did. So I told him about it, and I said the main job was to make sure it was a New York to London flight, not a New York to Paris flight."

The publicity coup had been achieved, and a successful flight made with, the 'unstart' aside, no technical problems. It wasn't a wholly happy day for the Americans at Farnborough, for while the SR-71 and its crew were being feted, the Sikorsky S-67 Blackhawk attack helicopter prototype crashed during its display in the afternoon flying programme, killing one of the two test pilots on board and putting the other in hospital, where he died nine days later. But the SR-71 remained the headline-grabber, present at the SBAC show all week, albeit static only — and not always on public view.

On 9 September, Widdifield recalls, "Jim and I took the airplane over to Mildenhall". It had been decided to go for a London to Los Angeles record on the return flight, this time with Capt Harold B. 'Buck' Adams as pilot and Maj William Machorek as RSO. They had been the supervisory crew for the

ABOVE: 61-7972 on the Mildenhall tarmac, being readied by its groundcrew. The first visit to the Suffolk base no doubt proved useful in preparation for future SR-71 operations.
DENIS J. CALVERT



ABOVE: Photographer Denis Calvert recalls well the events at Mildenhall on 12 September 1974: "After the press call, the ra-ra and the take-off, everyone went home. Less than an hour later, 17972 returned to Mildenhall after a snag and an illuminated caption, to make a final trans-Atlantic departure the next day."
DENIS J. CALVERT

outbound mission, deployed in advance to the Suffolk base. Again the attempt — mounted on 13 September — was successful, '972 covering the 5,463 miles in three hours 47 minutes and 39 seconds, equating to a 1,435mph average.

"We were just a flight crew", stresses Widdifield, "so we didn't understand all the machinations going on beyond, but it was clear among people from within the wing who were there, and a three-star from 15th Air Force, that they were happy we were able to make the thing happen, and I'm sure a lot of that was in their minds about future deployments if needed". More broadly, Gerald Ford had only assumed the presidency a few weeks earlier, following Richard Nixon's resignation over Watergate. "I think America needed a little bit of a political boost", Widdifield says with a smile. "I've heard people speculating that Goldwater and Ford wanted to do the flight for that very reason. They needed something positive that was happening about the US, and they thought it would gain a lot of publicity, which it did.

"And the thing I thought was really important was that it symbolised the long-term relationship between the US and Britain. It was a salute to that as well". The era of SR-71 operations from Mildenhall which would follow, and the intelligence they gathered, only served to cement that bond still further.

With thanks to Dr Kevin Wright.

RIGHT: The crews from the two record flights meet President Gerald Ford at the White House.
VIA NOEL WIDDIFIELD

With characteristic diamond afterburner shockwaves, SR-71A 61-7971 climbs out of Mildenhall on 2 February 1983. BOB ARCHER

BRITAIN'S 'BLACKBIRD' YEARS

1974

1 September
Arrival at Farnborough of 61-7972, breaking New York-London speed record

13 September
London-Los Angeles record set by 61-7972 on (eventual) departure from Mildenhall

1976

20 April
The return to Mildenhall of '972, accompanied by two of the 'Habu's' specialised KC-135Q tankers, for an eight-day deployment incorporating two training sorties over the North and Norwegian Seas and the English Channel

6 September
The second SR-71 to visit Mildenhall is 61-7962; as part of NATO training exercises 'Cold Fire' and 'Teamwork', it flies six sorties over the course of 19 days

1977

20 May
In the hands of pilot Maj Tom Alison and RSO Maj 'JT' Vida, 61-7958 flies the first operational sortie mounted from Britain by an SR-71, collecting electronic intelligence and high-resolution radar imagery of the Soviet submarine base at Murmansk

24 May
Another operational 'first': a mission over West Germany to cover the inner German border area, again by '958, with Maj 'Buz' Carpenter and Maj John Murphy as pilot and RSO

16 November
Inaugural 'Baltic Express' mission by Maj Bob Crowder and Capt John Morgan in 61-7976 en route from Mildenhall back to Beale

1979

16 March
A mission to the Middle East is flown from Mildenhall with '972, as tensions erupt between North and South Yemen, causing concern in neighbouring Saudi Arabia

31 March
Official establishment at Mildenhall of Detachment 4, 9th Strategic Reconnaissance Wing, then flying U-2s as well as SR-71s

1980

12 December
Start of the longest SR-71 deployment to Mildenhall yet, 61-7964 staying for four months due to concerns about the potential for Soviet military intervention against the Solidarity movement in Poland

1982

23 December
A second aircraft joins Det 4

1983

9 July
61-7955 arrives at Mildenhall, falsely marked as '17962', for a period of operational evaluation of the ASARS (Advanced Synthetic Aperture Radar System), before its integration into the whole SR-71 fleet

24 October
Det 4's first sortie to cover Lebanon, following the bombing by Islamic Jihad terrorists of a barracks used by US marines — this was a rarity in that the French government permitted an SR-71 overflight

1984

5 April
The British government agrees to the US request for permanent SR-71 basing at Mildenhall, putting Det 4 on a firmer footing

1986

16 April
The first of three Det 4 sorties to Tripoli and Benghazi, Libya, providing post-strike damage assessment following the 'Eldorado Canyon' raids; including the use of airborne spares, the small detachment generated an unprecedented six aircraft missions over three days

1989

20 November
Det 4 flies its last operational mission; the USAF's SR-71 programme ends the following day, its premature retirement caused by budget cuts

1990

20 January
Last SR-71 of Det 4, 61-7967, leaves Mildenhall

Mildenhall's annual Air Fetes provided Det 4 and its 'Habus' with some of their most prominent moments in the limelight. KEY

CLOSE ENCOUNTERS OF THE 333RD KIND

The Su-27 approaching the Norwegian P-3 on the port side. Bort 36 red hailed from 941 IAP PVO, stationed at Kilpyavr.
VIA TORBJØRN HAUGEN

Coming across the latest Soviet hardware was all in a day's work for 333 Squadron of the Royal Norwegian Air Force. But there was an occasion when the adversary became a little too near for comfort... **WORDS:** BEN DUNNELL

ABOVE:
The Royal Norwegian Air Force became the first Orion operator in Europe when 333 Squadron received its initial five P-3Bs in 1969. This is serial 601 over northern Norway.
VIA JAN JØRGENSEN

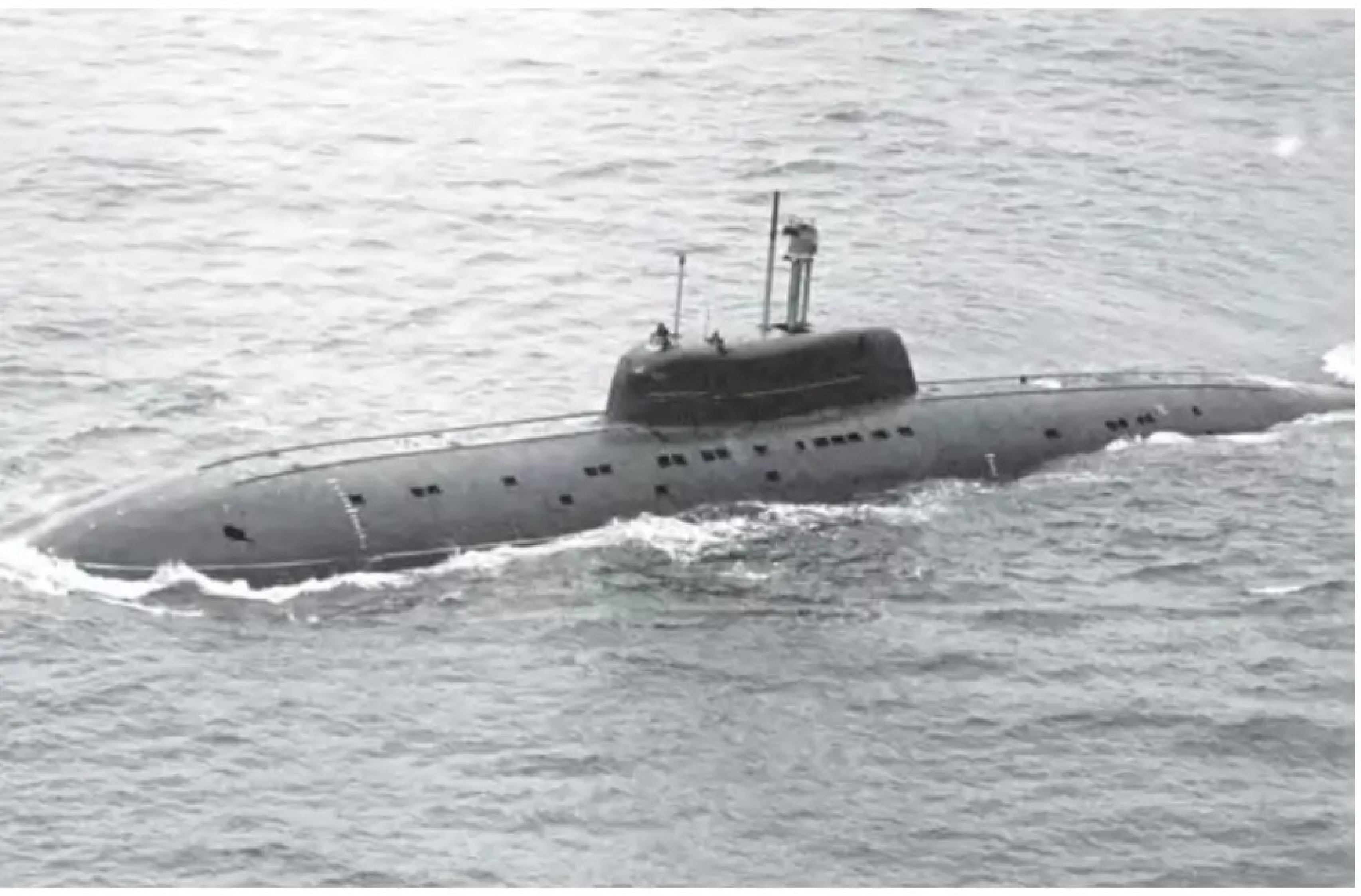
Droning along high above the Norwegian Sea in the 1969-vintage maritime patrol aircraft, there was at least a sense of how it must have been, if without the underlying tension. A long, over-water mission, the resonance from the four Allison T56 turboprops permeating the Lockheed P-3 Orion's whole interior, crew members from 333 Squadron, Royal Norwegian Air Force in the centre-section staring intently at their radar screens. But despite the superficial similarities, how different it was during the Cold War, when this P-3N model — latterly configured for coast guard, crew training and VIP transport work — served on the front line as a P-3B anti-submarine platform. And 'front line' really is the most suitable term, for encounters with the adversary were a regular occurrence.

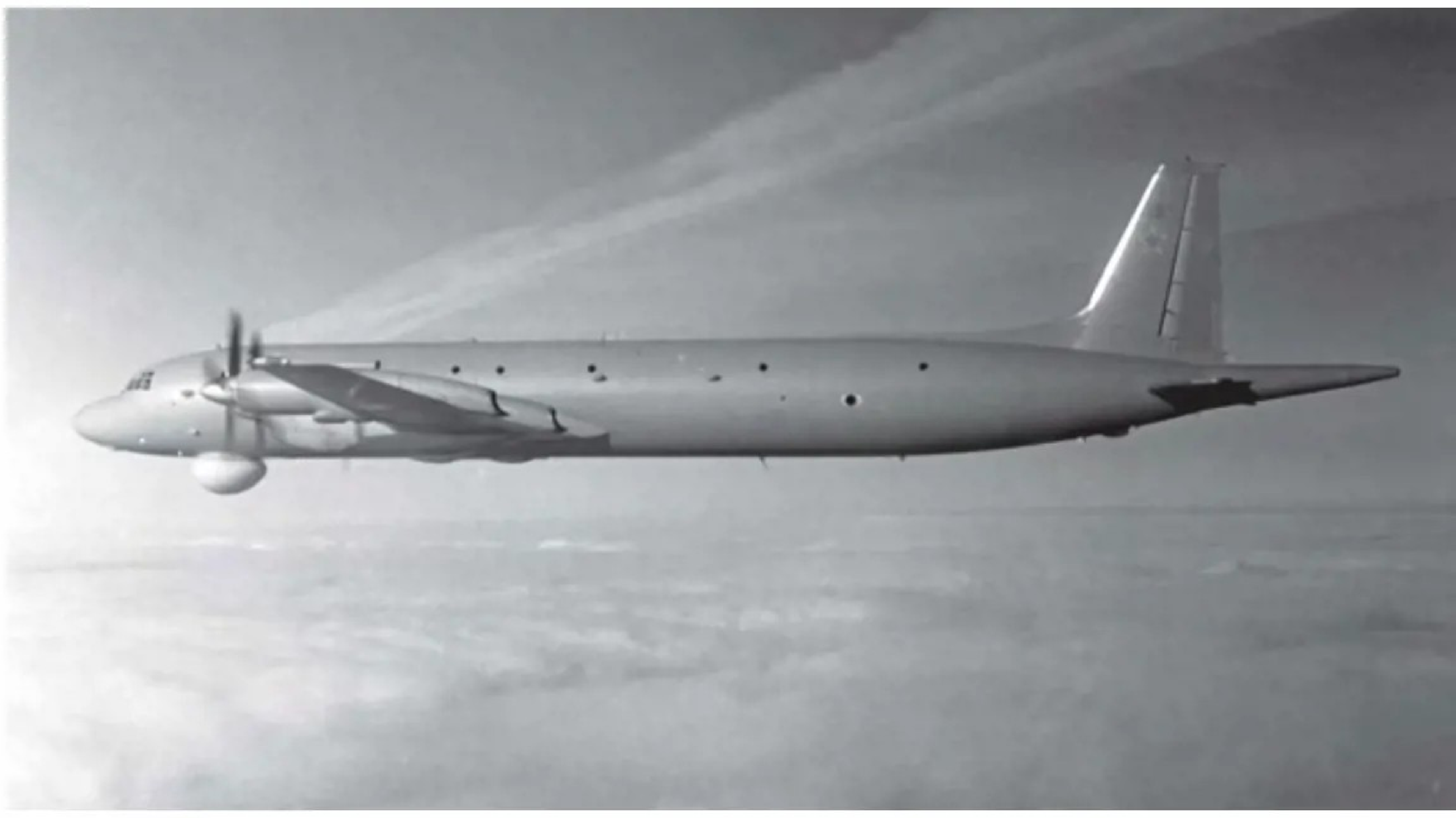
No risk of that on our sortie, a passenger transport detail from 333 Squadron's then base at Andøya, 190 miles north of the Arctic Circle in the Vesterålen archipelago, to RAF Lossiemouth. Since then the Orions, comprising the newer operational P-3Cs and second-line P-3Ns, have been retired in favour of the Boeing P-8 Poseidon, and 333 has moved to Evenes, a little further south, in the vicinity of Narvik. Yet these times of renewed East-West tension render its mission no less valuable, and the odd relic of those days remains. While the P-3B with serial 602 may have been sold to Spain, and subsequently retired, part of it remained with the squadron: a damaged propeller, testament to just how close it was possible to come to the latest Soviet equipment around Europe's northernmost extremities.

> ***"Encounters with the adversary were a regular occurrence"***

Given its proximity to the Soviet Navy's Northern Fleet, the post-war 333 Squadron had long punched above its weight. Replacing its Consolidated PBY Catalinas with the Grumman HU-16B Albatross from 1961 onwards, hours were spent shadowing Soviet vessels over considerable distances and locating submarines below the surface or photographing them before they submerged. But the amphibians were soon showing their age, and replacement with the proven P-3 Orion represented an obvious next step. The Royal Norwegian Air Force ordered five P-3Bs, crew training taking place in the USA prior to a first delivery during April 1969.

333 Squadron was fully re-equipped by the end of that summer, and soon engaged itself in some high-profile operations alongside the daily round of patrol and training details. When the coal-carrying ship M/S *Wenny* capsized north of Andøya on 31 July 1969, P-3s flew photographic missions as part of search efforts. The following year, they carried out surveillance of the erupting Beerenberg volcano on the island of Jan Mayen. In 1972, a large-scale search in the Sognefjord by Orions, helicopters and naval





ABOVE: K-239 *Carp*, first in the USSR's Sierra class of nuclear-powered attack submarine, was launched in August 1983. It was photographed by a 333 Squadron Orion the following year. ROYAL NORWEGIAN AIR FORCE

ABOVE RIGHT: A Soviet Navy Il-38 'May' ASW aircraft from a base on the Kola Peninsula, probably Severomorsk-1, joins its P-3 counterpart from Norway in close formation. VIA TORBJØRN HAUGEN

vessels for what was believed to be an unidentified submarine attracted much attention, but produced no definite results. The same was true of numerous similar operations mounted over the years ahead, which saw 333's aircraft using sonobuoys and depth charges to try and draw out the alleged intruders.

The advent of the Orion saw changes to the way patrols were conducted. "With the P-3", recalled the late Torbjørn Haugen, a retired 333 Squadron tactical co-ordinator and long-time chronicler of its history, "the tasking shifted to area searches, but reference to operational missions in daily squadron talk as 'tracks' remained well after my arrival on the unit". The operational burden was heavy, and fleet expansion necessary. Two ex-US Navy P-3Bs were duly purchased, arriving in 1980 to take to seven the squadron's Orion inventory.

Through the 1970s and into the 1980s, a fierce period in the East-West arms race, there was much new Soviet equipment to observe. Nuclear-powered ballistic missile-carrying submarines (SSBNs) of the Northern Fleet bound for a patrol area in the Atlantic east of Bermuda had to be tracked all the way, and to 333's Orions fell part of this responsibility. Coming out of their bases on the Kola Peninsula, the SSBNs would transit through the Barents Sea and round the North Cape, shadowed by the squadron's P-3s. Over the Norwegian Sea, US Navy Orions flying out of Keflavík, Iceland and RAF Nimrods from Kinloss joined the effort, relieving the Norwegian Orions which then returned either to Andøya or Bodø. These missions — to say nothing of the planning and debriefing involved — were long, yet crews had always to remain alert. Had hostilities commenced, the aircraft on station needed to be in position and ready to attack the Soviet sub.

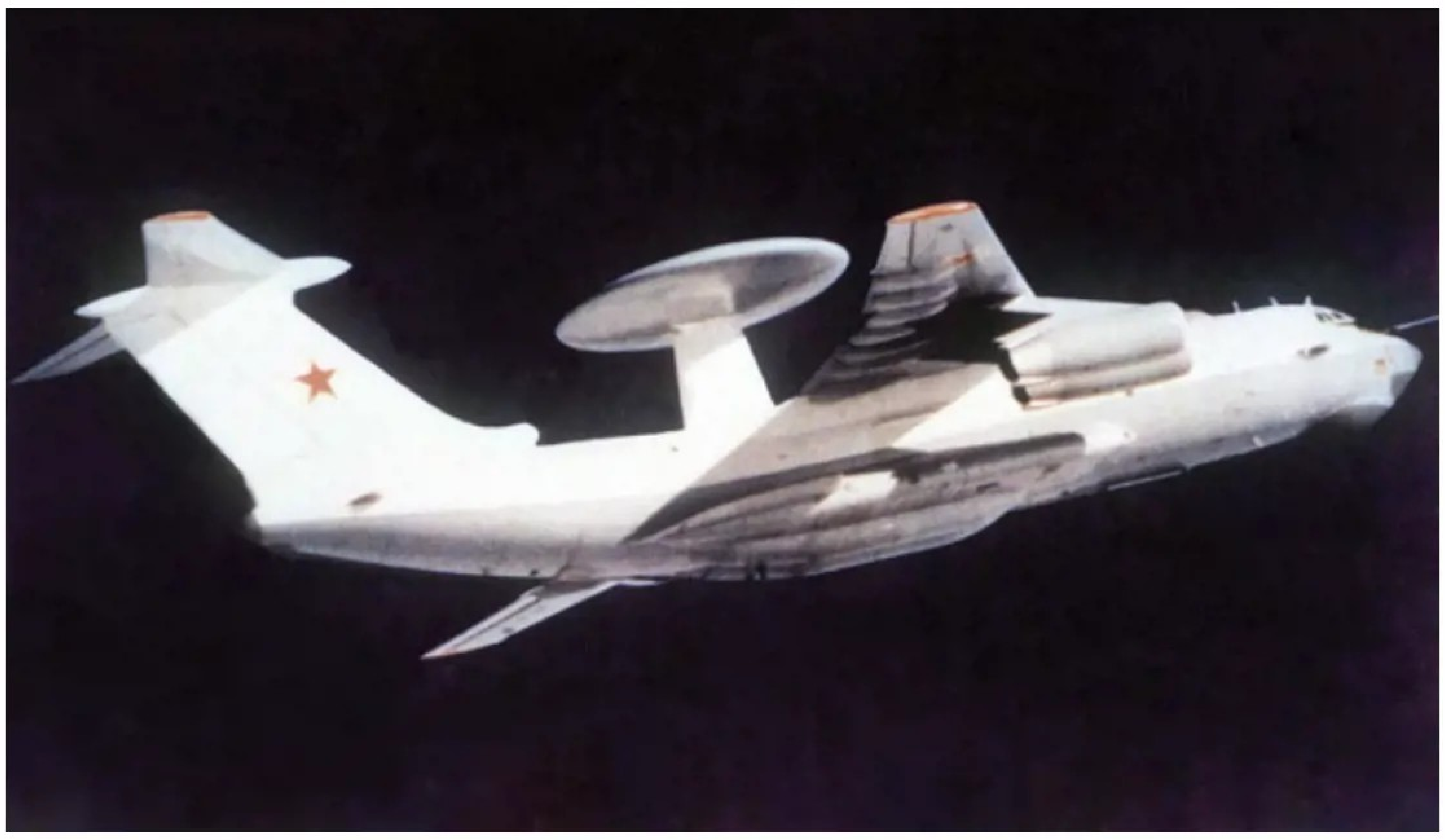
Appearances over the Barents Sea by recently introduced Soviet aircraft, meanwhile, saw 333 capturing some intelligence imagery of great interest. 1987 proved an especially notable year. A scoop for 333's cameras was the new Beriev A-50 'Mainstay' AWACS aircraft. Released that May, photos taken from a Norwegian P-3 gave NATO its first close look at an operational Sukhoi Su-27 'Flanker', two of which performed an intercept and escort. In September, 'close' barely made a start on it.

> *“The ‘Flanker’ pulled up and hit the P-3’s number four propeller”*

As Torbjørn Haugen wrote, "It was an early Sunday morning, 13 September 1987. Crew 8 of 333 Squadron was preparing for a regular ops mission with their P-3B Orion. The area to be covered included international airspace over the Barents Sea, as happened almost every day. 1st Lt Jan Salvesen was the pilot in command of the 10-person crew. Little did he know that today's flight was to be one of the most dramatic in the P-3 era of the squadron.

"As a contemporary account described, after take-off from Andoya the mission went normally until the aircraft passed Vardø, Norway's easternmost point. Vardø is also the location of one of Norway's early warning radars. The crew proceeded east at an altitude of 2,500ft and soon received a 'stranger warning' from the ground controller. An unidentified, but almost certainly Soviet, aircraft was closing on the P-3 at 590kt. This was not considered unusual, since the Soviets intercepted the squadron's Orions with varying frequency.

"Lt Salvesen decided to get above the cloud layer to identify the approaching aircraft. Climbing through 8,000ft the crew spotted the Soviet aircraft approximately 2nm abeam. It was identified as a Sukhoi Su-27 'Flanker'.



LEFT:
One of the images captured on the first sighting of an A-50 'Mainstay' AWACS platform in 1987. By then the type, based on the Ilyushin Il-76 transport, had been in service for around three years.
ROYAL NORWEGIAN AIR FORCE

"The P-3 levelled off on top at 13,500ft, on a steady course, and observed the 'Flanker' passing 3-4nm in front in a turn to port. The radar operator was now tracking the 'Flanker'. A few minutes later it came up from behind and joined the Orion in formation off its port wing. The crew had ample time to take good photos. The 'Flanker' was getting closer and closer. None of the crew had ever seen a Soviet aircraft that close before. The Su-27's starboard wingtip was now approximately 2m from the P-3's port wingtip. Suddenly the 'Flanker' accelerated from its position abeam the P-3, ignited its afterburners, banked right towards the Orion, then banked sharp left. The flight communicator (FC) and the tactical co-ordinator were both looking out of the FC's forward left window. They had the 'Flanker's' entire underside in clear view, missiles included. The jet's tail pipes passed in front of the propeller of the Orion's number one engine with only 1-2m clearance.

"Lt Salvesen immediately reported the incident to the ground controller at Vardø. The crew were shaken, but relieved that the 'Flanker' had not hit their aircraft, and that it hopefully would not return.

"Unfortunately, the radar operator at Vardø reported that the 'Flanker' was coming in again. With the fighter well to the Orion's left rear, Lt Salvesen lowered the landing gear, trying to tell the 'Flanker' pilot to stay further away. The Sukhoi then passed on the left. The Norwegian crew hoped that the Soviet pilot would quit his tight formation flying, but still he returned.

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"This time the 'Flanker' positioned itself on the P-3's right-hand side, closing in. Placing its nose just behind number four engine, the Soviet fighter was close enough to make the crew afraid of a collision.

"The 'Flanker' remained in close formation, sometimes moving somewhat erratically from side to side. Once, the pilot held both his hands up, flying hands-off less than 5m from the P-3. After some time, the 'Flanker' moved slightly away, then dived back in just below the Orion's starboard wingtip. The jet again ignited its afterburners, accelerated ahead, pulled up and hit the P-3's number four propeller with the tip of its starboard vertical stabiliser. The port vertical stabiliser of the Su-27 must therefore have passed just centimetres below the P-3's number three propeller.

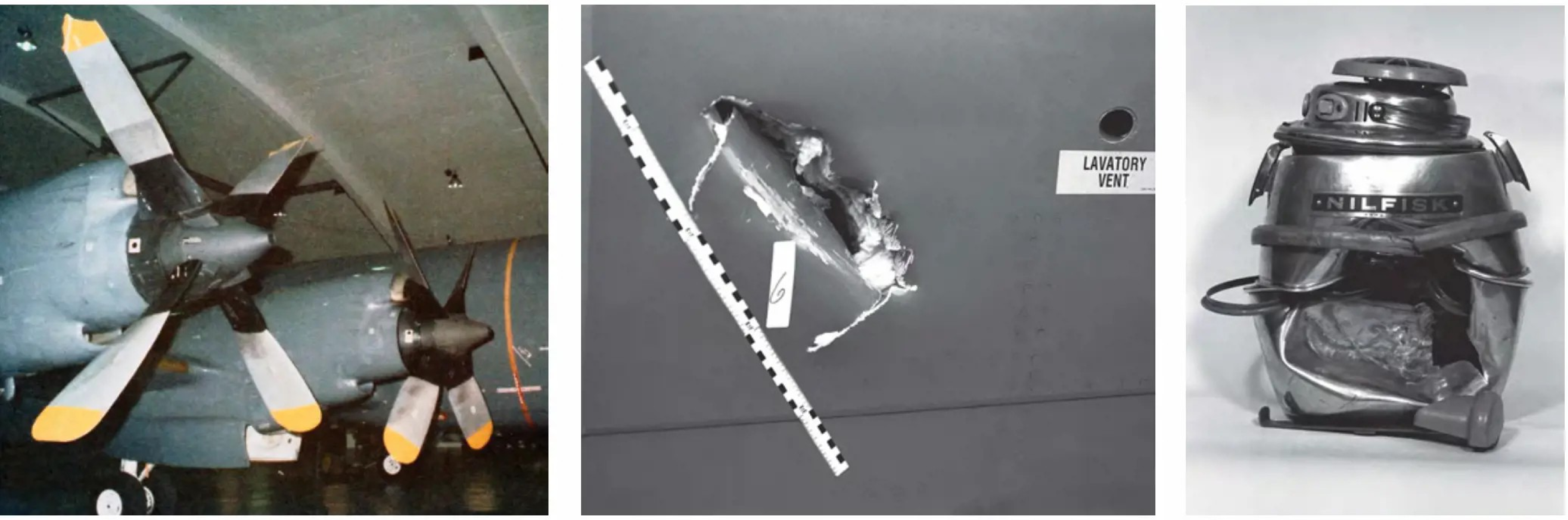
"The Orion started to vibrate violently. Pieces of the broken propeller penetrated its fuselage, and the crew could hear the sound of decompression as air escaped from the cabin. Number four engine was immediately feathered and shut down.

"An emergency message was transmitted and the aircraft descended to below 10,000ft. Upon examination the crew found a 25cm hole in the fuselage where a large piece from one of the propeller blades had penetrated the hull, demolishing the on-board vacuum cleaner, smashing it out of its locker and onto an equipment bay door across the cabin.

"Reaching the Norwegian coast, two Norwegian F-16s intercepted the Orion for a close inspection. They found no further external damage and escorted the P-3 to Banak, the closest suitable airfield. A three-engine landing was executed without incident at Banak, and a very relieved crew disembarked. Personnel at 333 Squadron learned a few months later that the 'Flanker' had subsequently flown around in the area for close to an hour before fading from radar range upon descending to its home base."

At the Orion's controls, Salvesen had acted entirely correctly. What of his Soviet counterpart? Lt Vasily Tsymbal belonged to the 3rd Squadron of the 941st IAP (Fighter Aviation Regiment), stationed at Kilpyavr just north of Murmansk. Part of the V-PVO, the Soviet Air Defence Forces, the unit had first received Su-27s during 1985. Different sources — none of them independently verifiable or

BELOW LEFT TO RIGHT:
Under-fuselage armament on the Su-27 comprised R-27T infra-red-homing and R-27ER semi-active radar-homing air-to-air missiles. In the cockpit was Lt Vasily Tsymbal, whose erratic manoeuvring led to the collision.
VIA TORBJØRN HAUGEN



ABOVE LEFT TO RIGHT: The Orion's damaged number four propeller pierced the hull and wrecked the on-board vacuum cleaner.
VIA TORBJØRN HAUGEN

referenced — attest to him having been an unruly character, but versions vary to such an extent as to make one question their accuracy. Was he posted to the Murmansk area after an incident in which he vented fuel from his aircraft over a Japanese naval vessel, or one where he flew so low that his wake turbulence blew a helicopter off its deck? Or, maybe, both?

Following the 'Flanker' collision, it is said in *Sukhoi Su-27 & 30/33/34/35* by Yefim Gordon and Dmitriy Komissarov (Crécy, 2018) that Tsymbal "was expelled from the Communist Party" within the space of just three days, but almost immediately reinstated, "awarded the Order of the Red Star and transferred to another unit based in Rostov — in other words, kicked upstairs". It goes on to say that despite a Soviet apology, the country's accident investigation "stated explicitly that both pilots were at fault", to the chagrin of the Norwegians. Tsymbal is reported elsewhere as having lost his life in a flying accident while serving with the 562nd IAP at Krymsk during the late 1990s.

> ***"A P-3 'kill symbol' was added below the Su-27's cockpit"***

His mount that September 1987 day, however, had survived. While Su-27 '36 red' (c/n 36911016816) was being repaired, it is said the opportunity was taken to alter the Bort number to '38 red'. The Soviets might therefore be able to deny the involvement of an aircraft marked as '36 red', in a vain attempt to circumvent the obvious truth. At some point, after another identity change to '31 blue', a P-3 'kill symbol' was seemingly added below the cockpit.

In strategic terms, the imagery taken from aboard the P-3 was a godsend. It provided the best views yet captured of a 'Flanker' carrying an under-fuselage load of R-27T and R-27ER (NATO reporting name AA-10 'Alamo') air-to-air missiles, which had not long been introduced. There wouldn't immediately be another chance, since the main consequence of the incident was that, for some time, no other Soviet fighter came near enough to a Norwegian P-3 as to enable visual identification. With Gorbachev's new era of détente towards the West set in train, there was obviously little desire to rock the boat.

As they say, the past is a foreign country. Especially since the start of the war in Ukraine, tensions are back on the agenda. Above the Barents Sea today, MiG-31s are the Russian Air Force's interceptors of choice, and just as they routinely shadowed 333 Squadron's Orions prior to their retirement, so the 'Foxhounds' have started to place Norway's new Poseidons in their sights. But, thankfully, they've tended to keep a safe distance.

With thanks to the late Torbjørn Haugen, who died in 2020, and Jan Jørgensen, who died in 2019.

BELOW: A rare formation of all five new P-3Bs, captured from one of the aircraft involved, with 602 in the lead.
VIA TORBJØRN HAUGEN

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"They were absolutely wonderful days"

So says top warbird flyer Keith Skilling about his time with the Breitling Fighters, the epoch-making warbird aerobatic team formed by the Old Flying Machine Company 25 years ago, and which still provokes the fondest memories **WORDS:** JEANNE FRAZER

As the Corsair touched down against the stunning backdrop of New Zealand's South Island in April 2004, it was for the final time as part of the Old Flying Machine Company's quite extraordinary mixed warbird formation display team that had established its reputation across Europe as the Breitling Fighters. The sponsorship had ceased six months earlier, two of the aircraft had been returned to New Zealand from whence they came, and Kiwis Ray Hanna and Keith Skilling were joined by their wingmen at Warbirds over Wanaka, an airshow that had stolen the hearts of many visiting British display pilots over the years. Hence the Antipodean swansong was flown with Ray and Keith in their original Kittyhawk and Corsair mounts, with Nigel Lamb and Lee Proudfoot in a Wanaka-based Spitfire XVI and P-51D Mustang respectively, borrowed from the late Sir Tim Wallis. It was an opportunity relished by the Breitling jockeys, to revive a routine they'd adored flying and to salute what had been a decidedly special era.

Sufficient cross-threads already bonded the Breitling Fighters pilots before the four-ship team display evolved, but the concept of combining four dissimilar, high-performance World War Two fighters to fly a set routine that incorporated formation aerobatics was a brave, if not audacious move. Each type has its own distinct handling characteristics, all have different wings, they're of varying weights and their engine power ranges from 1,150 to 2,100hp. Fortune would have it that Ray Hanna boasted the exceptional leadership skills demanded to expertly manage the individual inconsistencies in response by the assorted aircraft following him, to the point where most onlookers were happily persuaded that the apparently effortless, perfect formation loop they were witnessing was a doddle to fly.

Based at Duxford, OFMC was first contacted by Breitling, the Swiss chronographer manufacturer, in 1998. The company had flirted briefly with the concept of a Harrier display team, to be run by Royal Air Force Benevolent Fund Enterprises — then the organisation behind the Royal International Air Tattoo — but ultimately became convinced that association of the brand with World War Two fighter aircraft would provide the right image. Ray's son Mark steered OFMC at the time, and was pivotal not only to the company's management and flying, but to their sponsorship negotiations and the resulting five-year Breitling contract that would commence in 1999. Without him, it simply would not have happened. According to Nigel Lamb, "Obviously it was Ray who had the legendary status, but only Mark could have pulled off the deal. He had the charm, looks and charisma, and was a walking encyclopaedia of Second World War aviation. It was a good marriage."

> ***“Only Mark Hanna could have pulled off the Breitling deal”***

Initially there was no notion to establish a formation team. Breitling was content for the fighters to appear under its banner as singletons, pairs or whatever combination suited individual organisers at venues across the UK and Europe, allowing Mark the freedom to adapt and tailor participation accordingly. And a wide range of types was offered: OFMC's P-40E Kittyhawk, P-51D Mustang, Spitfire IX, FG-1D Corsair and Hispano Buchón, as well as mounts from other operators.

Although this flexible pattern formed the modus operandi throughout 1999, spectators at May's Southend Airshow and then the Biggin Hill Air Fair in June were treated to a glimpse of what was to come when the Breitling Fighters staged an aerobatic four-ship. That season a raft of fellow warbird pilots also helped the Hannas wave the sponsor's flag: Carl Schofield, Brian Smith, Nigel Lamb, Cliff Spink, Lee Proudfoot, Steve Johnson, Alister Kay, Andy Gent and the late Al Walker. And Keith Skilling, who retains a vivid memory of Breitling's stylish set-up for the formal sponsorship announcement in Switzerland: "We'd positioned five aircraft to Basel and it was just fabulous, with a marquee built around the aircraft, all shown off magnificently with their yellow

OPPOSITE PAGE: On the break during the Breitling Fighters' early days, the two Royal New Zealand Air Force wartime combat veteran fighters that meant so much to Ray Hanna: the P-40E Kittyhawk and FG-1D Corsair. VIA AIR DISPLAYS INTERNATIONAL

BELOW: Biggin Hill in 1999 was the team's second show as a four-ship, the line-up consisting of P-40, Buchón, P-51 and Corsair. The Spitfire IX was on overhaul that season, but returned thereafter. PETER R. MARCH

ABOVE: Kittyhawk and Corsair en route between Buochs and Le Bourget during the summer of 2001.
KEY/DUNCAN CUBITT

noses lined up". The extravagant manner in which Breitling set about hospitality operations was to be a familiar part of the seasons that lay ahead.

After Nigel Lamb's initial check-out in Spitfire MH434 in 1993, he became a regular pilot for OFMC, and in due course a shareholder in the Buchón and P-51 *Ferocious Frankie*. Realising demand for displays would increase with the Breitling agreement, he took a break from captaining DC-8 freighters for MK Airlines, to instead spend the summer flying the fighters — unaware his future involvement would be far deeper. The late September weekend towards the end of the 1999 season was a demanding one for OFMC, with aircraft split between display commitments in France, Italy and Spain. Mark had taken the Buchón to join two of the other aeroplanes at Sabadell airport, from where they would launch the following day for the Barcelona waterfront display, but tragically crashed turning onto final approach and died from his injuries the next evening. Nigel, meanwhile, had flown the Mustang to an airshow in Italy.

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On their return to Duxford, the pilots were told by Ray that Breitling had been in touch to commiserate and was keen to continue the sponsorship, if that was OFMC's wish. He spent some days thinking about it before posing the question to Nigel: "If I decided to continue, would you be willing to run it?" Naturally Ray was aware of Nigel's extensive experience of sponsorship and operation of display teams, and knew Mark had approached him for guidance when preparing the proposal for Breitling. "Mark's death changed everything in Ray's life", says Nigel, "so when I took on the job I found myself asking him what he really wanted to do and which aeroplanes were important to him. So we shed things like the MiG-17 project which weren't relevant to the kernel of OFMC and refined its operation to the core piston-engined fighter aircraft."

Back in the summer, Lee Proudfoot had just left British Antarctic Survey and was flying for Virgin Atlantic as a first officer. He remembers an informal chat outside one of the Duxford hangars, when Mark asked if he'd consider leaving the airline to work for Breitling. And when Nigel took over he was approached again, this time by Ray, to ask if he'd join OFMC on a full-time basis. Ray was brutally honest — "It might only be for a year" — but airline flying was never truly in Lee's DNA and he needed no urging to hand in his notice and formally become part of the team. As he says, "Ray and Nigel decided my destiny."

Nigel immediately tasked Lee to oversee flight operations, so he could concentrate on the contracts and bookings. The pair of them had shared many hours in formation, they were accustomed to working alongside each other on a professional basis, and crucially could switch echelon positions. Nigel summarises the significance: "When Lee came on board, the real idea of focusing on a four-ship with a set routine became a no-brainer."

Another pilot who boasted the right pedigree was Keith Skilling, who'd amassed vast aerobatic formation experience and been a leader of the New Zealand Warbirds Harvard team, the Roaring Forties. His Corsair days dated back to 1991, when he'd been asked to fly the aircraft acquired from America by the Alpine Fighter Collection at Wanaka. He and Ray knew one another from New Zealand, but it wasn't until 1994, on a visit to the UK that happened to coincide with commemorative events in Normandy for the D-Day 50th anniversary, that Keith was first invited to fly for The Fighter Collection. He ended up taking its Corsair to France, in company with Ray in OFMC's. Thereafter he was in high demand on his annual visits to Duxford for Flying Legends, and with the prospect of a full Breitling Fighters display season in 1999 he took unpaid leave from Air New Zealand, an arrangement he was more than happy to repeat when invited by Ray the following year to join the regular formation team.

On the handful of occasions when Keith was unavailable, Cliff Spink was the stand-in called upon to fly what he affectionately refers to as "the dear old Corsair", the first occasion being in early 2001. Only Ray could have rung an air marshal and told him, "Get your arse into gear. Keith can't get over here and I want you in the four-ship". Cliff comments, "This is where I can only say I had to learn fast. First, I go up and do line-astern pairs aeros. Later that day I'm in a full four-ship rehearsal. Two days after that we perform the routine at Duxford's Spring Air Show!" He was again recruited to fill Keith's shoes for that year's Duxford Autumn Air Show, and then for the May 2002 display.

"The Corsair has lots of power, a big wing and is a gorgeous aeroplane to fly, so I wasn't in any way stressed, or limited in handling the power", Cliff explains. "Box is probably the easiest position if you're going to find yourself suddenly in at the deep end. It's the wingmen who really have to work because of the Spitfire and Mustang's power and handling differences, needing adjustments in the vertical to remain in echelon."

> *"The idea of a four-ship with a set routine became a no-brainer"*

The sheer visual impact of four magnificent vintage fighters in formation, combined with the spine-tingling soundtrack of their powerful piston engines, was spectacle enough that the sequence itself didn't need to be complicated. "To be honest", Nigel admits, "we didn't have to do that much practice. Fighter operations are so expensive that you can't afford to spend hours finessing manoeuvres. The rule was to keep it simple, which also meant going easy on the aeroplanes themselves."

Lee adds, "I do remember a discussion about who was to fly what, as both Nigel and I were happy left or right in the Spitfire or Mustang, so the side we flew didn't have any bearing. It was performance in the vertical which threw up the problems, so what mattered was to get the power right in the looping plane. Ray elected to lead with the Kittyhawk as the most underpowered aircraft — except

TOP: **Keith Skilling and Ray Hanna bid farewell to a Breitling representative in the gorgeous Swiss Alpine surroundings of Buochs following a corporate event.** KEY/DUNCAN CUBITT

ABOVE: **Ray Hanna, Nigel Lamb, Keith Skilling and Lee Proudfoot about to receive the trophy for best team display at 2000's Biggin Hill Air Fair.** KEY COLLECTION

CLOCKWISE FROM TOP: 2002 saw the Kittyhawk, Corsair and Mustang in new colours. BEN DUNNELL

How so many of us remember them: the Breitling Fighters foursome goes vertical at a Biggin Hill show. KEY/DUNCAN CUBITT

October 2003's Duxford swansong, The Fighter Collection's P-51D *Twilight Tear* filling in for the OFMC's own *Ferocious Frankie*. BEN DUNNELL

With the P-40 out of action — an effort to put it on the UK register being stymied because the stress analysis record couldn't be proven — and the P-51 unserviceable, for Biggin Hill in 2003 Spitfire XVI TD248 and XVIII SM845 were brought in from Historic Flying. ALAMY

in a dive, that is, when it would overtake the Spitfire which just stops at 300mph! So he had to handle it in a certain way, and throttle back in a dive". Tucked in at the back was the Corsair. Described by Keith as "hugely powerful, manoeuvrable and reliable, with beautifully harmonised controls", its 2,000hp radial engine meant it always had spare capacity.

The inaugural public display by the Breitling Fighters in the format which became best-known in terms of P-40 leading Spitfire, Mustang and Corsair was at the 2000 Biggin Hill Air Fair, where the four-ship was awarded the Shell Trophy for best team. But its first appearance that season was as a threesome at Cholet in France. Lee had ferried the Kittyhawk there, a sortie he remembers with some clarity for the landing: "I touched down and the next thing I knew the aircraft was veering all over the runway. Finally I got it under control and taxied in, to find Ray standing there, grinning. After I shut down he said, obviously still amused, 'Oh, didn't I tell you never to three-point the Kittyhawk on a hard runway? Well, you won't do that again, will you?'"

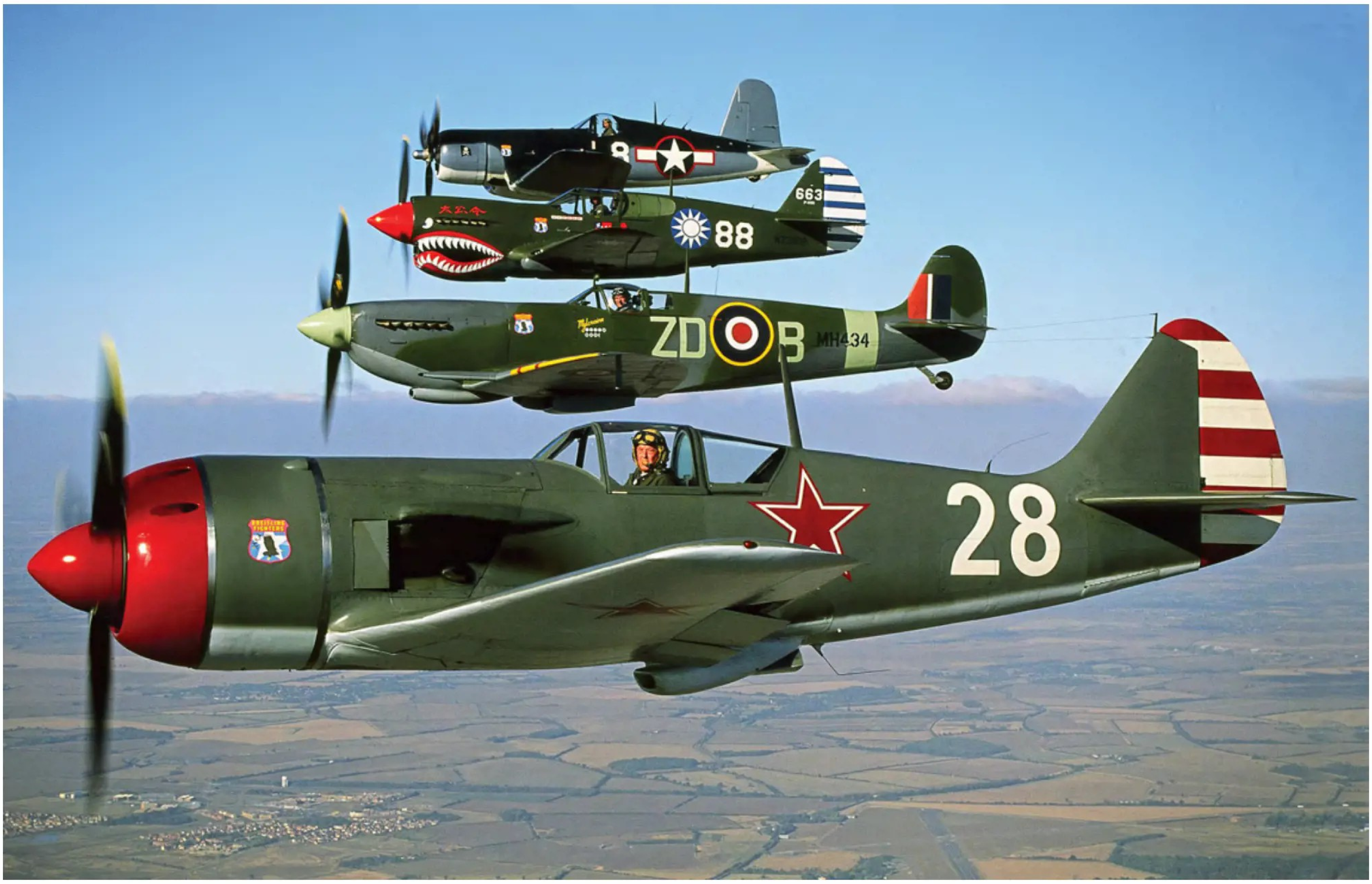
Fortunately for OFMC, the Breitling principals were themselves aviators and so appreciated the fundamental challenges posed by the operation of old aircraft, in particular their proclivity to develop a snag at inopportune moments. But in tandem they still needed reliability to mirror the classic dependability of their product.

> ***"Everyone was familiar with Ray's briefing: 'Don't fly lower than me!'"***

Hence funding was available to pre-position aircraft in advance to a distant venue, or for a reserve aeroplane to guarantee whatever had been promised. "That took a lot of the stress out of it", says Lee, "and it certainly made for more relaxing ferry flights". And over the course of the Breitling years, OFMC frequently called upon fellow operators who willingly lent their fighters to the cause, among them Robs Lamplough and Stephen Grey of TFC.

But 2000 was a challenging year for OFMC. There were engineering issues to contend with and, in parallel with its Breitling commitments, the company needed to fulfil the demands of a contract to provide aircraft for the filming of *Dark Blue World*, which took place in the Czech Republic. Another factor was that Ray's work commitments in Basel sometimes conflicted with Breitling dates, whereupon Nigel was obliged to lead the formation, with Steve 'Jos' Johnson slipping into the four-ship as wingman.

From 2001 onwards, Ray led every formation display. But as Nigel relates, "He never led the transit flights, but followed and used a chart rather than GPS. Lee used to draw the maps. One time we'd left Holland and were heading for Switzerland, routing through an area of north-east France that's just a nightmare, where the chart's a mass of red lines, restricted areas, low-flying corridors and military avoid areas. And the weather wasn't great. I needed to avoid some airspace and



turned about 20° to the right. Within less than a minute I hear Ray's drawl over the radio, asking why we're going off track; he was always right on the ball and knew precisely where he was. After landing he wanted to know why we'd drawn the route 'through all this red stuff'!"

Both Nigel and Lee emphasise how important the Kittyhawk was to Ray. After the Japanese attack on Pearl Harbor, P-40Es ordered for the RAF were diverted to the US Army Air Corps in the south-west Pacific, and subsequently handed over to the Royal New Zealand Air Force. The OFMC aircraft, NZ3009, had served with No 14 Squadron. "The Kittyhawk's a real pilot's aeroplane", Lee says, "and Ray absolutely loved it and everything about it, being the short E-model. I remember one of the early days at Duxford when he said, 'I just want to go and fly, and you need to keep current. You have the choice of all these aircraft, so which one will it be?' I chose the Corsair because it wasn't an aircraft I got to fly much and I just think it's phenomenal. Ray's relief was palpable: 'Oh, I thought for one moment you were going to pick the Kittyhawk!'"

In parallel with airshows, an aspect key to Breitling was the team's presence at its corporate events, and OFMC's provision of vintage two-seaters in which guests could be flown. The classy 1999 media launch recalled by Keith heralded the flamboyance that would hallmark the sponsor's annual fortnight-long jamboree at Swiss alpine airfields such as Samedan, Saanen-Gstaad or Buochs, the spectacular settings summed up by Lee as, "real chocolate-box, with snow on the mountain caps and the sun shining". Staged on a grand scale, hospitality was decidedly top-notch, and Breitling sales teams were invited from all over the world to enjoy a VIP experience.

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Each day would kick off with a Breitling Fighters team display. "Buochs was an ex-military base which still housed the Pilatus factory, and although pedestrians and vehicles had public access, automatic barriers would be raised by air traffic when aircraft flew, to indicate temporary closure", Nigel explains. Every single morning as the team got airborne, he would hear Ray asking the tower for confirmation that the barriers had been *lowered*. It finally dawned on Nigel that Ray's insistence was down to the fact that in his inimitable fashion he wanted to fly very, very low. Every pilot who flew with him became familiar with the briefing: "Don't fly lower than me, boys!"

Once the team had displayed, guests selected their activity from a confection of enviable options: sightseeing around the peaks in a helicopter, steering a Bentley round the mountain's hairpin bends, wingwalking on a Stearman, a tandem parachute jump or joining Le Mans legend Derek Bell on an alpine drive. Or, indeed, flying in a two-seat vintage aeroplane. Breitling often asked for six or seven to be on site, a common line-up being Harvard, Robs Lamplough's or Anders Saether's Mustang, T-28 G-TROY, Hunter, L-39 and T-33. Additional pilots would include Cliff, Alister Kay, Mark Linney and the late Louis McQuade.

"One year, I flew 19 passenger trips in the T-33 from Buochs over four days", recalls Cliff. "The topography lent itself to what

ABOVE: The OFMC's superb Lavochkin La-9 wore Breitling logos for its sole British show season, 2003. Over the Shoreham display weekend, Ray flew it solo, in a separate slot from the main team.
RICHARD PAVER

RIGHT: The great Ray Hanna, at the controls of his beloved P-40, ready for the last display of a legendary team. GAVIN CONROY

could be described as somewhat exuberant flying; pulling up over a jagged saw-tooth ridge, diving into the next valley and then pulling fairly tightly round a lake”. Keith Skilling enjoys recounting an especially exhilarating sortie when his passenger in the P-51 was a member of the Swiss aerobatic team, chasing Cliff in the T-33 around the alpine peaks: “There were no rules other than ‘don’t crash’!”

Even at the Paris Air Show, Breitling’s priority was the corporate flying. The four-ship wasn’t sanctioned to display there, so a solo was launched for the daily flying programme. “But”, Keith says, “eight or nine times every day their helicopter would shuttle guests from Le Bourget to Pontoise, where we’d based the Mustang to be able to give them flights, after which they’d be helicoptered back.”

BELOW: One final Breitling Fighters break, over Wanaka’s unmistakeable terrain. For the Easter 2004 show there, the Alpine Fighter Collection’s Spitfire XVI TB863 and P-51D *Miss Torque* were used in place of their UK-based counterparts. The P-40E and Corsair had been shipped back to New Zealand in December 2003 — the Corsair recently flew again after several years on the ground, while the Kittyhawk has been sold to a new owner in Australia. GAVIN CONROY

By early 2002, Breitling bosses had begun to sense a shift away from the old fighters was in order. They’d gone so far as to ask Ray to consider operating a Super Constellation instead, but a 1950s airliner would not have reflected the declared founding principles of OFMC: to operate and display to the public wartime fighters, and to fly them in the way they were flown then. So, when the sponsorship contract wasn’t renewed, it came as no surprise.

During the five-year epoch of the Breitling Fighters, more than 2,000 individual sorties were flown and 600 displays presented across 13 countries, culminating in the team’s farewell performance at Duxford’s 2003 Autumn Air Show, with Ray flying the Kittyhawk, Nigel in MH434, Lee in TFC’s P-51D *Twilight Tear* and Keith in the Corsair. The aircraft had displayed as far north as Stockholm, as far south as southern Spain and east to Berlin, an area of operation that was huge for vintage fighters, often entailing long positioning transits that were accomplished without ground support. Nigel is rightly proud of that achievement, and the record of having provided the expected number of aircraft at every venue.

> ***“I can’t believe how lucky I was to fly in a team of such companionship”***

In Keith’s words, “They were absolutely wonderful days, and I was fortunate enough to fly right through from day one until the end”. Lee treasures his Breitling Fighters experience as being rich in memories: “I can’t believe how lucky I was to fly in a team of such companionship, sitting on Ray’s wingtip, to zoom all over Europe in those wonderful aeroplanes, listening to his briefings, debriefs and all his amazing stories. It was just brilliant”. In more laconic style, his summary is, “It was the first set routine flown by a regular team using four different warbirds, with four pilots flying around having a very nice time!” He recalls Ray announcing after the Duxford finale, “I’m going to take the Corsair and Kittyhawk to New Zealand”, and musing to himself that if he and Nigel got themselves out there they could all join up again for a swansong. And that’s exactly what happened…

The author thanks Nigel Lamb, Lee Proudfoot, Keith Skilling and Cliff Spink.

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AEROPLANE meets

JON CORLEY

KEY/BEN DUNNELL

He dreamed as a child of flying B-17 *Sally B* — and now, thanks in no small part to his formative flying years with Air Atlantique, he does

WORDS: BEN DUNNELL

"I was about 12 years old, and my father was driving through Essex, past the Essex Showground. *Sally B* was doing a display there, and she flew straight over the top of us. I remember looking up and thinking, 'Wow, I want to do that'. Well, it's taken a while to get there…"

Everyone who's ever flown what is now Europe's last airworthy B-17G Flying Fortress has been in an honoured position. For Jon Corley, given that childhood memory, it's a particularly special experience. Having set his sights on *Sally B*, he wasn't to be denied. It was a long road, but pursuing it brought many other flying opportunities in historic aeroplanes, among them types few other Britons have sampled. Above all, this was thanks to Air Atlantique, the Coventry-based company that seeded the scene with so many talented pilots, especially when it came to heavy multi-engined machinery.

It also contributed much to the preservation of vintage jets, a lot of which have been sold or grounded since Air Atlantique ceased operating. Jon worked his way through them too, so it's appropriate that we met for lunch at the Elms pub in the Leicestershire market town of Lutterworth. It's directly adjacent to the roundabout on which is displayed a pole-mounted Gloster E28/39 replica, recalling how Frank Whittle moved his Power Jets firm's workshop to Lutterworth in 1938, and developed Britain's first flying jet engines there. When flying Air Atlantique's jets, Jon regularly used to dip a wing over the roundabout as his own salute.

"I always wanted to be a pilot", he says. "I think it came from my younger years, between the ages of one and five, when we lived in Surrey, not far from Heathrow. My father used to take me there to watch the aeroplanes from a multi-storey car park. That, I believe, is where the seed was planted. After school I fell into an apprenticeship doing electronics at GEC-Marconi, and one day I bumped into an old schoolfriend in town. He said he'd just had his first flying lesson. I thought, 'Hang on a minute. You wanted to be a vet. I'm the one

October 1995, and about to indulge in some Piper L-4 flying. VIA JON CORLEY

Curving the beloved B-17G Flying Fortress *Sally B* onto the display line at Old Buckenham. BEN DUNNELL

First steps in Air Atlantique's historic aircraft were aboard the Prentice. KEITH BLINCOW/AIRTEAMIMAGES.COM

ABOVE: Commemorating the 60th anniversary of the start of the airlift, DC-3 G-AMPY's trip to Berlin Tempelhof in 2008 had Jon at the helm. BEN DUNNELL

who wanted to be a pilot.' That was the kick I needed to sell my car and put all the money into doing my PPL at Earls Colne. I did that in 1995, in a Cessna 152. But, at the same time, a friend I worked with at Marconi had a Piper L-4 'Grasshopper,' so I used to go and fly that with him. I couldn't log it, because at that point I had no PPL, but it was fun flying from a farm strip. As long as I put the fuel in it at the end of the day, it cost nothing. About £10 an hour it cost us. It was excellent. I still look back on those days very fondly.

"From the flying club I got to know of someone who worked at Air Atlantique, so I went up to Coventry and had a look round. I ended up on the cadet scheme there as a cadet pilot. Before that I used to get *Flight International* magazine, and I've still got my copy of the 1989 airlines directory. I was going through it, putting a star next to the ones where I wanted to get a job. One of them was Air Atlantique because it had the DC-3s, and I thought that was what I needed to do to be able to fly the B-17. Back in 1989 I was forming the plan. My training was with Piers Smerdon and Andy Simmons, the two main instructors, and Kath Burnham as the examiner who made sure we were up to standard — and it was a very high standard we had to make."

The cadet programme was just one string to Air Atlantique's bow. Exactly as Mike Collett had intended, it produced a cadre of first-class pilots for the company, providing them with an affordable way in and a thorough, all-round grounding in aviation. And the range of sectors

RIGHT: For the 2010 Sywell show, Jon flew the Anson to lead an Air Atlantique twins pair, followed closely by John Dodd in DC-3 G-AMRA. BEN DUNNELL

LEFT: With John Dodd in G-AMPY during the last few months of DC-3 pleasure flying. ALAMY

BELOW LEFT: Heading home from Fairford in the Twin Pioneer with passengers on board. KEY/STEVE FLETCHER

in which the Coventry-based outfit was active gave newcomers to commercial flying, like Jon, the chance to develop skills that would stand them in good stead. Some of that related to contemporary equipment, but as the years passed and parts of the Atlantic Group were separated off, so the historic fleet assumed greater prominence.

"I flew a variety of aircraft there in different roles", says Jon, "including aerial reconnaissance, which I became the chief pilot for. I tried to manoeuvre myself in the business so I'd be in the right place for the DC-3. Some pilots who'd gone through the system before me were flying the Metroliner, and they had the DC-3 as their second type. So I volunteered to fly the Metroliner just as the company restructured itself, and had all the turbines in one part, which was called Atlantic Express, and all the pistons in another. Had I gone DC-6 I would have got the DC-3 as well, but I went onto the Metroliner and ended up with that and the Cessna 406. I flew coastguard patrols, and with the Metroliner I did a lot of freight and VIP passenger flights — all sorts, really. Whatever would pay money, we would have a go at and do. It was good to have the broad experience of all the different operations.

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"It wasn't until 10 years through the company, when I was chief pilot for the Classic Flight, that I managed to fly the DC-3. In some ways it wasn't too bad, because it meant I didn't do all the freighting throughout Europe, with it raining inside the cockpit and some of the other horror stories the other guys have.

"But I had a passion for the vintage aircraft, so at weekends I was flying the Prentice initially on pleasure flights, and gradually I transitioned onto the Dragon Rapide and the Devon. I've got a lot of love for the Prentice, because it was very formative in vintage aviation for me. I actually developed a bit of a passion for Percival aircraft and did my research into them, so I managed to move on to the Pembroke and I did the first flight on the Proctor that was restored. I got on to the Jet Provost, which has Percival heritage, and the piston Provost I've flown outside Air Atlantique.

"My first display was in the Prentice at the Coventry airshow in 2003, and it was comical. It was supposed to be a formation display — Tiger Moth, Magister, Chipmunk, Bulldog and the Prentice. Back in those days the briefings weren't quite as comprehensive as they are now, but one thing I did say to the leader, who was flying the Tiger Moth, was, 'Whatever you do, don't go up. The Prentice doesn't climb.' So, he gets to the end of the display line, and the Tiger Moth with its two wings happily levitates. Up he went, and at the time I didn't really have the experience to know how to catch up. It ended up being a bit of a cat-and-mouse, chasing around the sky."

> ***"When I was flying, Classic Flight was the best job in the world"***

The biggest step occurred when the Classic Flight, later known as the Classic Air Force, became a distinct entity. "Mike Collett said he wanted to set it up as a viable business in its own right. He needed a chief pilot for it, and asked if I'd be interested. I took the role, and got to fly a large range of very interesting aircraft ranging from the Chipmunk all the way up to the Meteor. When I was flying, it was the best job in the world, without a doubt. It had its moments on the ground…

"The Twin Pioneer was a wacky aeroplane, but a lot of fun. I didn't get a huge amount of time in it — probably only about 50 hours. I actually found the cockpit a bit too big for me; it was more of a man's aeroplane, and I'm a bit more boy-sized. It needed somebody with longer legs than I have.

"We were asked to take it across to Belfast for a No 230 Squadron reunion, because that squadron used to have Twin Pioneers. They put the aeroplane in a hangar and hid it away, and they had all the old boys there in the bar having chats, sharing war stories. It was great talking to Sunderland pilots and Twin Pioneer pilots. Meeting veterans has always made a flight more memorable, and gives it more of a purpose. Then they all got escorted through to the hangar and there it was: the Twin Pioneer. People were gobsmacked — they didn't even know one was still flying, let alone it would be there for them to see. That was quite a moving experience. But also the flight there and back with Jon Gowdy, across the sea: it was a fantastic day, with white, fluffy clouds.

"Another one was when we brought a Dragon Rapide down to a press day for the Goodwood

Revival, all dressed up in vintage attire. It wasn't the best weather, but we managed to get there. Then coming back there were thunderstorms everywhere. We could see a whole line of thunderstorms stopping us getting to Coventry. I'd flown the Rapide down and was a passenger coming back, and the pilot flying said, 'Right, let's go into Oxford.' We turned towards Oxford, and a bolt of lightning came down, hit Oxford and all the lights went out. The pilot decided to go to Brize Norton. The weather was upon us at that point, and we were running along the bottom of the cloud. We called Brize, told them we were on a PAN and needed to divert. Out of this dark sky, lightning everywhere, came this 1930s Rapide with everyone dressed in 1930s attire. It looked like we'd just come through a timewarp."

For some time, practically no-one else, apart from Mike Collett, flew the Anson T21. "I loved the Anson", comments Jon, "but I hadn't flown other, similar aircraft at the time, like the Beech 18 and the Lockheed 12". It was his mount in July 2005 when several Air Atlantique aeroplanes took part in the flypast over London to mark the 60th anniversary of the end of World War Two, the Anson flying with Bernard Chabbert's Lockheed 12, BAE Systems' Avro XIX and Plane Sailing's Catalina. "Let's just say", he muses, "I wrote a letter to the Royal Air Force afterwards, expressing my displeasure with how things were run. They replied saying, 'It won't happen again, so it doesn't matter.'"

Something else not destined to happen again was DC-3 G-AMPY's trip to Berlin in June 2008, visiting Tempelhof one final time before it closed and Air Atlantique had to stop its 'Dak' pleasure flying operations. "It was fantastic just to have the aircraft parked under the canopy there, with the airport name above it. So was the flight out there with the other DC-3s, going through Lelystad, and the approach to Tempelhof with all the buildings around you. The whole thing was a bit of a blur for me, because I flew out to Berlin and then had to get a commercial flight back because I had some pleasure flying or an airshow or two to do, and then went back out again. It was all very rushed, which was Air Atlantique for the 20-odd years I was there! But it was a privilege, and I really enjoyed it."

As the 2000s wore on and other organisations disappeared, the Classic Flight became Britain's premier operator of airworthy vintage jets, and Jon got to fly them all except the Canberra. "I was very privileged to move on to the classic jets. The first jet I ever flew was the Vampire, which was quite nice. Most people's first jet is a 737 or something like that, but mine was the Vampire. I went down to Bournemouth and did my training with Brian Grant — excellent fun."

> ***"Most people's first jet is a 737 or something, but mine was a Vampire"***

That Vampire, T55 G-HELV, went to Jordan for a flypast in June 2006 celebrating the 60th anniversary of the country's independence. Jon was given the job of ferrying it back. "I managed to convince Mike Collett I needed to take a navigator with me — my new cadet at the time, Jon Gowdy. I wanted someone to bring all the charts and look after that side of things. He reluctantly approved, because there was obviously extra expense in getting us out there with hotels and things. I said it would be good for Jon to learn the aircraft, because there would be nine or 10 hours of flying someone else was paying for. We took a scheduled flight out to Frankfurt initially, and I said to Jon, 'Where's all the charts?' 'Oh, yeah. I forgot them.'..

"When we got to the aircraft in Amman, it didn't have any oil. It uses an old oil, not the one modern turbines run on. We scoured the whole airfield, we went to every maintenance facility there. No-one had any. We even went to talk to the crew of a Hercules that 'wasn't there' — they told us specifically, 'We're not here' and that they weren't talking to us, but they didn't have any either. In the end we found a Vampire covered in dust in their museum, so we had to drain the oil out of it and put it in our Vampire, just to get it out of Jordan to the next country where we could get some oil. And we were running out of daylight. Everything was stacked against us at that point. We flew from Jordan back to the UK with just a hand-held GPS and no charts whatsoever.

"Then I was on to the Venom, the Jet Provost T5, the Jet Provost T3 and eventually, after a bit of persuasion, the Meteor. Once we had the two-seat Meteor T7, that allowed me to get converted onto it. Initially the CAA was a bit reluctant to put me on the Meteor without a twin-stick". Indeed, it had previously been the case that to fly the Gloster jet, you needed either Canberra or prior

BELOW: On joyriding duty at Old Warden with Dragon Rapide G-AIDL. BEN DUNNELL

BELOW RIGHT: A flypast over Duxford in Howard 500 N500LN, during its time at Coventry. DAVID WHITWORTH

Meteor time, meaning Dan Griffith had ended up as Air Atlantique's sole Meteor pilot.

"I think it came from Robbie Metcalfe when he was at the CAA", says Jon. "He was an ex-Canberra pilot, and because of his upbringing through the RAF with the Canberra, he knew of the problems that can be involved with asymmetrics on these aircraft, so that was the probably wise decision."

How was the Meteor conversion process on first acquaintance, which began soon after the T7 flew in 2011, and ended with Jon becoming the first purely civilian pilot to qualify on type in the modern era? "In fact, it was a non-event. I did my training with Dan, who's obviously highly experienced in everything… The aircraft is quite benign, as long as you stay away from two areas: one is the notorious 'phantom dive', and the other is an engine failure on take-off. We did practice scenarios as required, obviously at altitude at first. The aircraft can handle one engine — it's whether the pilot can push the rudder hard enough. You kind of develop your own limiting speed of what you can handle from how much force you can push with one leg. But the aircraft itself doesn't have any major vices.

◆

"The NF11 especially was very benign. Its flying characteristics were like the T7, but better, with that different tail format and slightly longer wingtips. That was a much more stable aircraft. The T7 did have an issue where, if you pulled some g, the stick force would get lighter, which very soon meant you were pulling even more g, and you could potentially overstress the airframe. That was one thing to be careful of. But apart from that, it was quite manoeuvrable and not too unstable. We did fly around single-engine on transits, because it didn't carry much fuel. It was standard procedure for us to take off and, at about 1,500ft, shut one engine down. A lot of people are horrified when they hear that story, but it's actually in the pilot's notes as a standard procedure. Not a problem."

In 2016 the reluctant decision was taken to close down the Classic Flight and sell its fleet. "I think Mike Collett decided that if he didn't pass the aircraft on while they were airworthy, they wouldn't get passed on. Unfortunately, the world has changed around us. There are fewer and fewer airshows, the cost of fuel is so much more, and the cost of insurance is so much more, if you can get it. It makes it harder and harder every year."

There were still a few tasks to perform, such as ferrying the Vampire to its new home with the Royal Jordanian Air Force Historic Flight. Fellow pilot John Dodd told that adventurous story in our interview with him last year. But with Air Atlantique having shut up shop, Jon was on the look-out for new employment. It came with a corporate jet operation on the Cessna Citation Mustang and now the Citation CJ2+, which is still his main job. "I do it as a freelance

ABOVE:
Only once, in the summer of 2015, did Air Atlantique's two Meteors fly together. Jon was in the T7, with Dan Griffith aboard the NF11.
RICHARD PAVER

RIGHT: Spitfire IXT ML295 is among those used by the Biggin Hill Heritage Hangar for passenger rides. Jon was flying it for Classic Wings at Duxford last spring.
BEN DUNNELL

pilot", he says, "so I have control of my roster and I can fly other aircraft."

He'd started doing so back in his Air Atlantique days, one highlight being Howard 500 N500LN. "It was down at Exeter for many years and hadn't really flown much at all. Then a chap in America who already had a Howard 500 flying, Tony Phillippi, bought it and wanted to fly it back to Minnesota. It needed some work done to it, so it went to Coventry, where we looked after it for a year or two. He wanted to do a tour of Europe before it went back home, but the American pilots weren't confident flying in Europe, so he asked me to go to America and do my type rating so I could help them.

"The Howard 500 is a beast. It's heavier than a DC-3, it's twice as powerful as a DC-3, and it will bite you if you don't give it respect. It's an aircraft that needed big runways, really — suitable for America, not so good on some of the shorter runways at airfields round here. Nice to fly, but quite a complicated aircraft with its systems and so forth. And Tony Phillippi had a Grumman Albatross, which was a lot of fun. I'd never done anything on the water before, but I had a go in the Albatross and he said, 'Have you done lots of sailing?' I said no. He told me I just seemed to have taken to it, so the very next day I went and got my seaplane rating, I loved it that much. I did that on a Cessna 172, and then got a second-in-command rating on the Albatross."

Jon's hankering to fly a Spitfire dated from his PPL training at Earls Colne, when he saw LFXVIe TD248, then in its post-war red-and-silver air racing scheme, based there in Eddie Coventry's ownership. He spent some time doing Harvard pleasure flights from Duxford with Classic Wings, so had taken an important stride towards warbird fighters, and was checked out on a two-seat Spitfire with the Aircraft Restoration Company. However, there wasn't the chance to fly the type more regularly until, in 2021, he began doing so with the Biggin Hill Heritage Hangar on SSAC (Safety Standards Acknowledgement and Consent) passenger rides.

◆

"At Biggin Hill the chief pilot is Dan Griffith, who obviously I flew with quite a lot in the Air Atlantique days. When Don Sigournay stopped flying for them, they had a bit of an opening. They still had quite a few pilots, but could have done with a few more. I 'phoned up Peter Monk, we had a chat, I went down there and the rest is history. I started flying their Spitfires, and I managed to get onto the two-seat Hurricane, though sadly they don't have that any more. It's nice to have done them both, to be able to compare the two.

"The SSAC system with two-seaters has produced a market for more pilots to come through, which has been brilliant for the whole industry. It means there are more companies manufacturing parts, there are more engineers who've got experience, there are more pilots who are current, and there are passengers wanting to fly in them. It's a win-win situation for everyone, definitely. Hopefully that can transition on to other aircraft.

"The problem I've got, now I'm flying so many of the childhood dreams, is where do I go from here? I'm ticking a lot of the boxes as I go along. I'd still like to fly Spitfire TD248, and I have spoken to the owner about it, so I'll see if that's a possibility in the near future. From when I was a child, I've wanted to fly

RIGHT: Returning from his first flight as captain of B-17G *Sally B*, with Peter Kuypers in the other seat, at Duxford in September 2021.
BEN DUNNELL

a P-40, and I've always been a fan of the Bristol twins like the Blenheim, Beaufighter, Buckmaster and Buckingham. For a very long time, the Blenheim was high on my list of things I'd love to fly… unfortunately, that probably won't happen for me, but you can't fly everything."

The Mosquito is another of those aircraft, but Jon does at least get to taxi one. He became one of the Lincolnshire Aviation Heritage Centre's taxi run pilots at East Kirkby on Lancaster *Just Jane*, and now gives rides on Tony Agar's Mosquito NFII in addition. "When I put the power on for a fast taxi run, it feels like it wants to go. It's so tempting to just get the tail up, but there are strict instructions not to."

And there are plenty who, unlike Jon, haven't flown as important an historic aircraft as Lockheed 12A Electra Junior G-AFTL, the ex-Sidney Cotton reconnaissance platform now owned by Fighter Aviation Engineering. "I thought I was just going to be doing training on it, because I'm a multi-engine instructor and examiner. I was drafted in to train up some of their pilots, but they decided to let me display it". In fact, he had the distinction of giving the Lockheed its public airshow debut, at Duxford in June 2023, while the link with Fighter Aviation Engineering enabled him to do an initial check-out on TF-51D Mustang *Contrary Mary*.

Yet if there's a jewel in the crown, it's *Sally B*. "It was a coincidental conversation at a hotel bar in Bournemouth, during the Bournemouth airshow. I was round the same table as the B-17 crew, and said it was something I'd always wanted to fly from a very young age. Nothing was said at the time, but they needed more crew, and Peter Kuypers knew I had the right experience. He spoke to Elly Sallingboe, and I got the invite there and then: would you like to join the team for *Sally B*? Well, I didn't need to think about that one. It was a definite yes straight away. I was a co-pilot for two seasons, and then in September 2021 transitioned to the left seat, becoming captain.

"Due to my previous experience on large, multi-engine tailwheel aircraft like the DC-3 and the Howard 500, there was the initial trust there that they didn't need to teach me how to fly large taildraggers. It was just learning the B-17. As a co-pilot we go and do engine failures — go-arounds on three engines, landings on three engines, that sort of thing — and general emergency procedures. When you go across into the left-hand seat, you then do double engine failures and some of the more serious emergencies.

> ***"Now I'm flying so many childhood dreams, where do I go from here?"***

"And we go out to Holland to use the DC-3 simulator there and practise emergencies on it, including emergencies in displays. That's proved invaluable for us, particularly to sneak in engine failures when you don't realise it — so, not one that suddenly goes 'cough, bang' and you know it's failed, but one that's slowly started to lose power, and the point at which you realise is when you're at 200ft mid-display trying to climb out, and you can't.

"The B-17 training is just like it would be on any other aircraft, with general handling, steep turns and bashing around the circuit, trying to get the landings right. It's not easy. Obviously it's a much heavier aircraft, so there's a lot more momentum and energy management to think about. With a DC-3 you can put the gear down and it'll start slowing down. With the B-17, you put the gear down and it just keeps trucking along. You do need to think further ahead with bringing the speed back. Once I was able to get my head around that, it wasn't too bad.

"There's not much difference between displaying a B-17 and a DC-3, really. They're similar in handling characteristics in the respect that they're quite slow to roll, but they can be quite manoeuvrable in pitch, so you can climb if you want to. We do have a 2g restriction on the B-17, which is a company restriction, just to preserve the aircraft and not put too much stress on it. I have to be careful of that, because sometimes I can get too excited…"

Then, of course, there are the more emotive aspects of flying such an aeroplane. "On one of my early flights on *Sally B*, going out to Roskilde in Denmark, we actually flew over the Essex Showground — the exact point where I'd seen her as a child. That was an excellent trip, because flying long sectors is good, and the route we took saw us flying over some quite poignant sites that had been bombed by B-17s back in World War Two. It was a very well-received aircraft at the airshow, and we were the star — it was almost red-carpet treatment. We also did a flypast for Elly's family home while we were there. It was very meaningful in many ways.

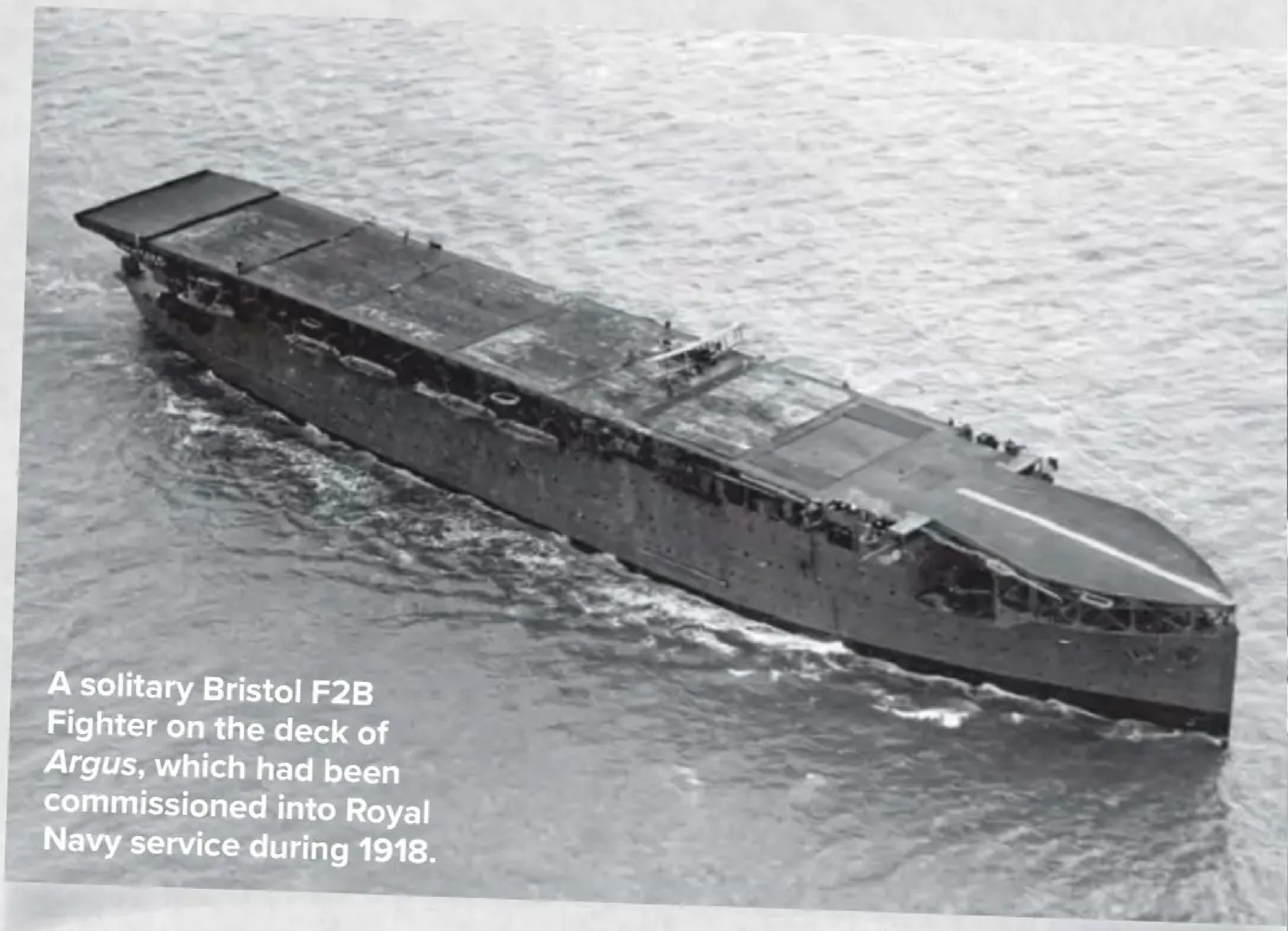
"My son often asks me what my favourite aircraft is out of those I've flown, and I explain to him there are different aircraft for different needs. The Chipmunk I love: it's just cheap and fun. The Dragon Rapide I love: I would miss that if I never flew it again. The Venom, because you can go fast and throw it around. I used to love the Venom. Obviously the Spitfire, because it's a Spitfire. And then it's a call between the B-17 and the DC-3". How fortunate Jon is to be able to reel off such a list of types, just a fraction of those he's flown — and how fortunate vintage aviation is to have a pilot of such wide ability and down-to-earth enthusiasm.

LEFT: **Tucking the gear up on Lockheed 12A G-AFTL before this illustrious aeroplane's debut display at Duxford last year.** BEN DUNNELL

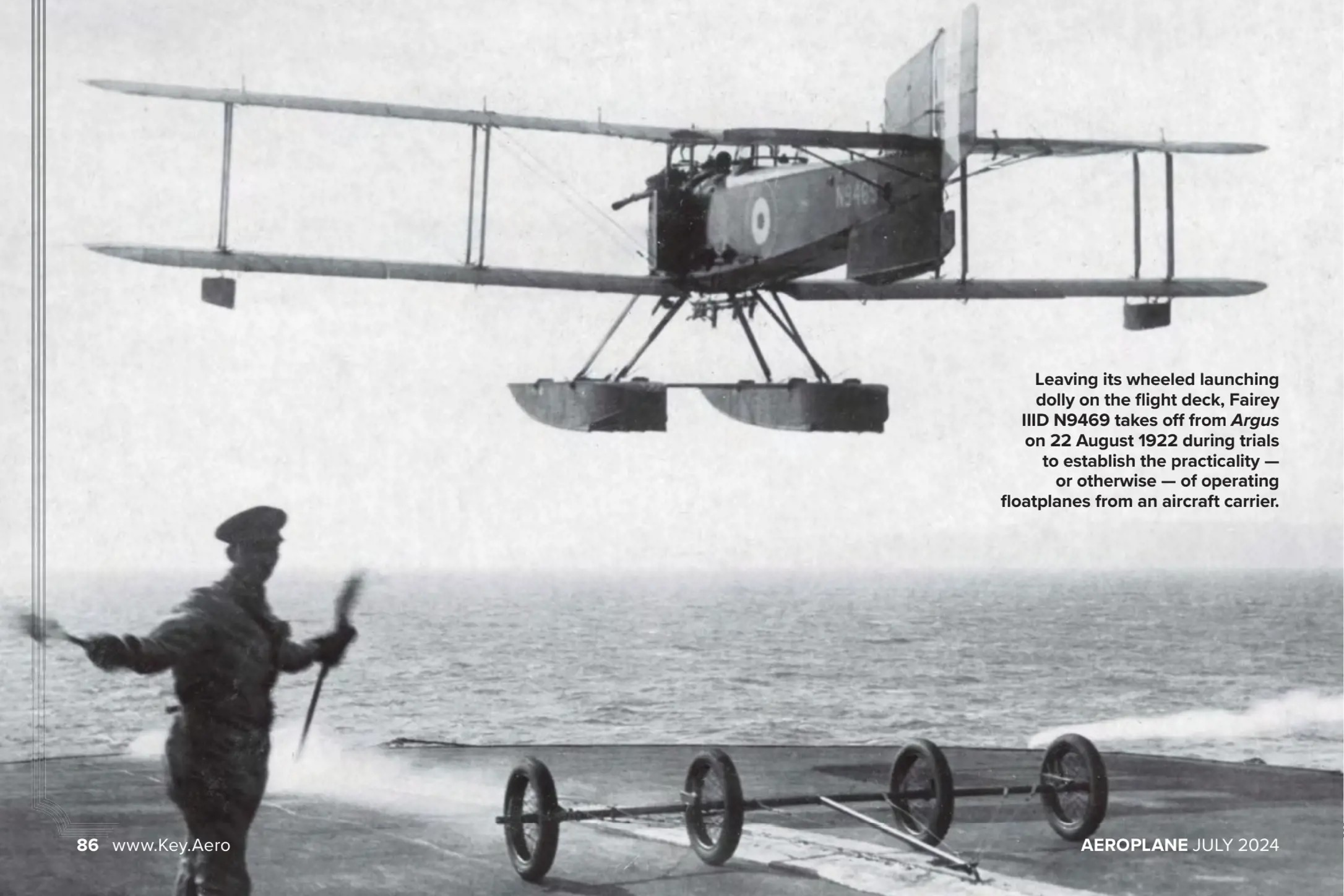
HMS ARGUS

1922

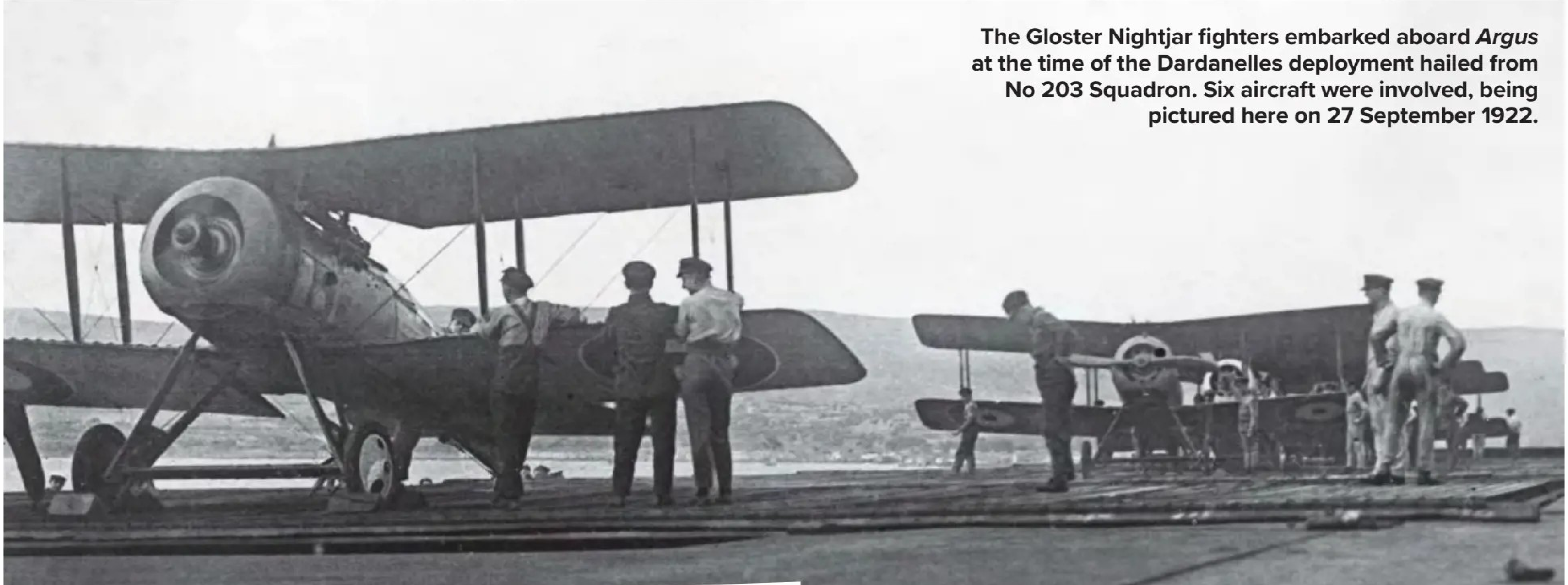
Continuing the series of Personal Albums featuring the images of RAF photographer **Paul Phillips**, we go aboard HMS *Argus* in 1922. The Royal Navy carrier was deployed to the Dardanelles strait as part of the response to the Chanak crisis, in which the revolutionary Turkish government located in Ankara during the country's war of independence sought to return those areas under Allied control to Turkish rule



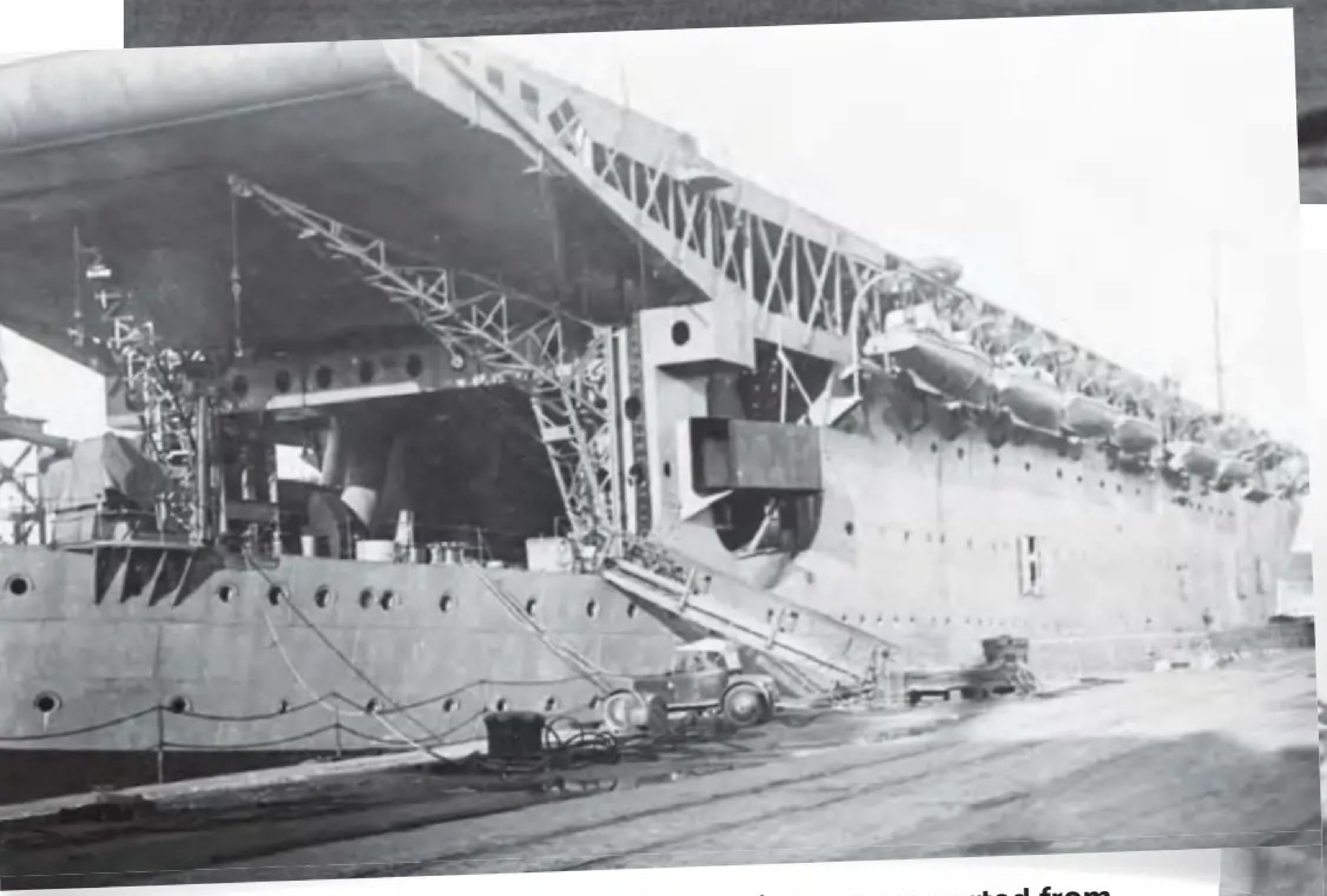
A solitary Bristol F2B Fighter on the deck of *Argus*, which had been commissioned into Royal Navy service during 1918.



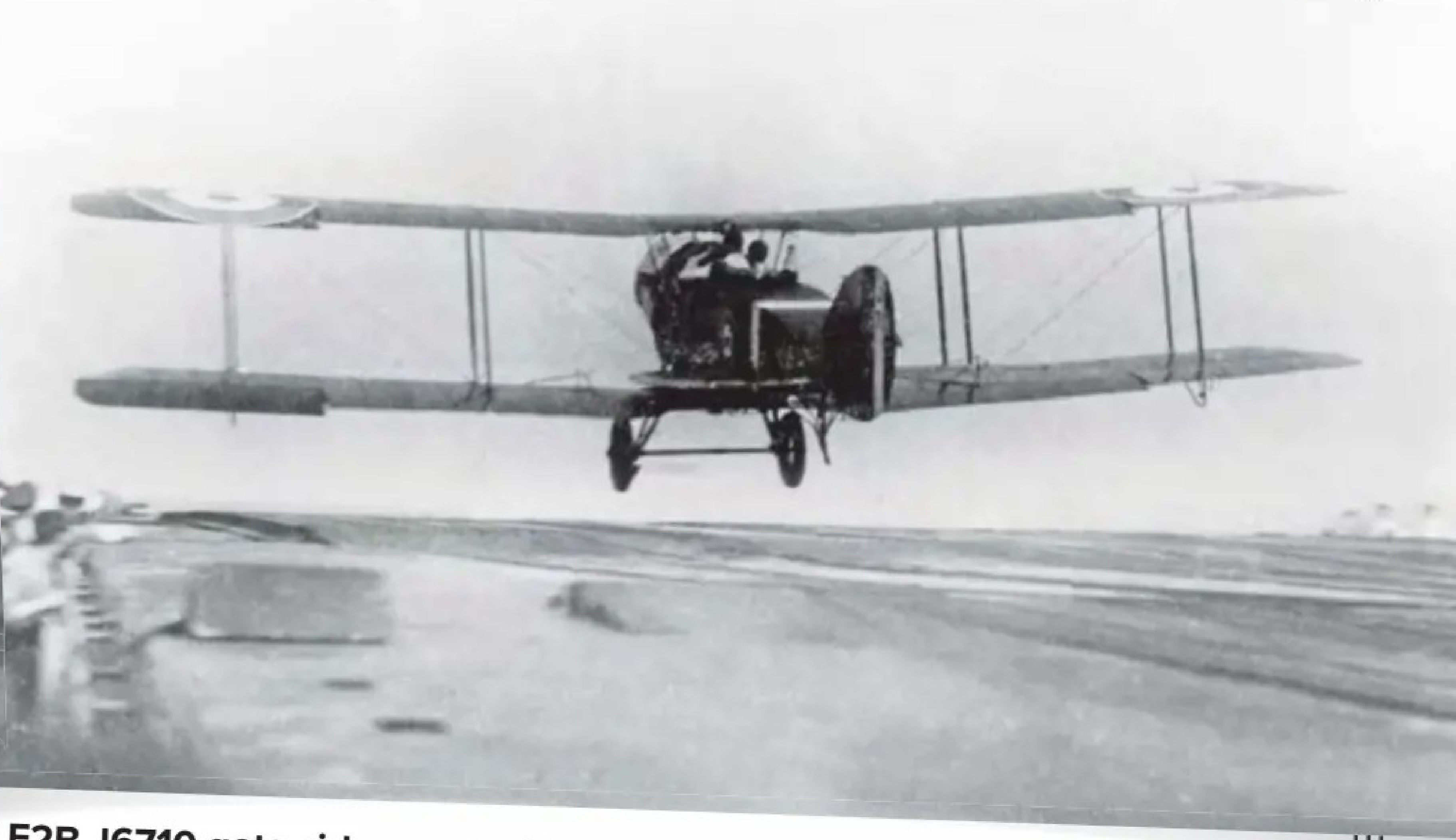
Leaving its wheeled launching dolly on the flight deck, Fairey IIID N9469 takes off from *Argus* on 22 August 1922 during trials to establish the practicality — or otherwise — of operating floatplanes from an aircraft carrier.



The Gloster Nightjar fighters embarked aboard *Argus* at the time of the Dardanelles deployment hailed from No 203 Squadron. Six aircraft were involved, being pictured here on 27 September 1922.

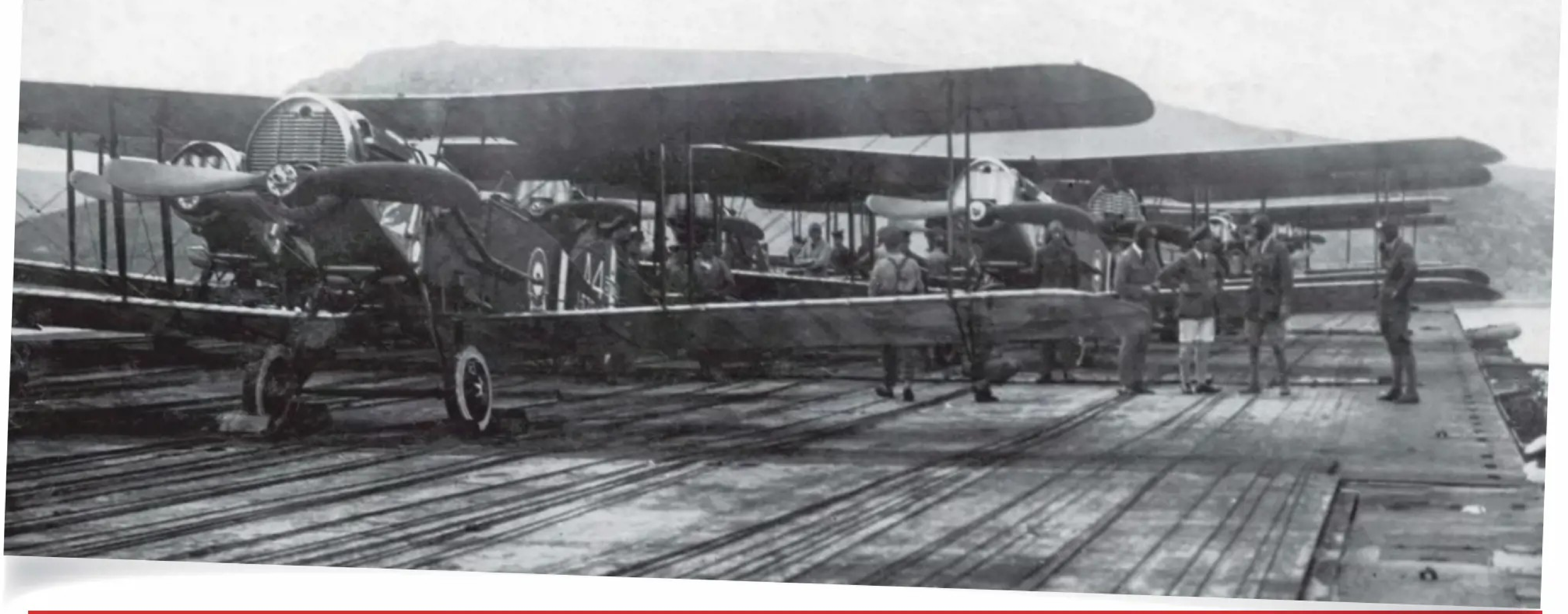


***Argus* in port, location unknown. The carrier was converted from an ocean liner being constructed by Beardmore, named *Conte Rosso* and destined for Italy.**



Bristol F2B J6710 gets airborne on 11 October. This aircraft belonged to No 4 Squadron, RAF.

No 4 Squadron's dozen 'Brisfits' — awaiting launch on 11 October — sailed to the Dardanelles aboard HMS *Ark Royal*, which was just a seaplane carrier and had no flight deck. They were taken to Kilia Bay and transferred to *Argus* using a crane before being reassembled and flown off to Kilia airfield. It was the first time any of the unit's pilots had experienced carrier operations.



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'WOODEN WONDER' RETURNS TO SKIES
July 2024 issue of FlyPast features a phenomenal warbird on its cover. De Havilland T.43 Mosquito NZ2308 recently returned to the skies in New Zealand after long-term restoration. We reflect on the history of this aircraft and salute those who made the dream of its revival into a reality. Plus, we chat to Steve Hinton, the pilot of this and countless other famous aircraft.

SOLE SURVIVOR
Darren Harbar goes air-to-air with the Shuttleworth Trust's Hawker Tomtit, the world's only remaining example of the type

VICTORIA CROSS
We salute RAF Coastal Command veteran John Cruickshank, the last living recipient to be awarded the VC during World War Two

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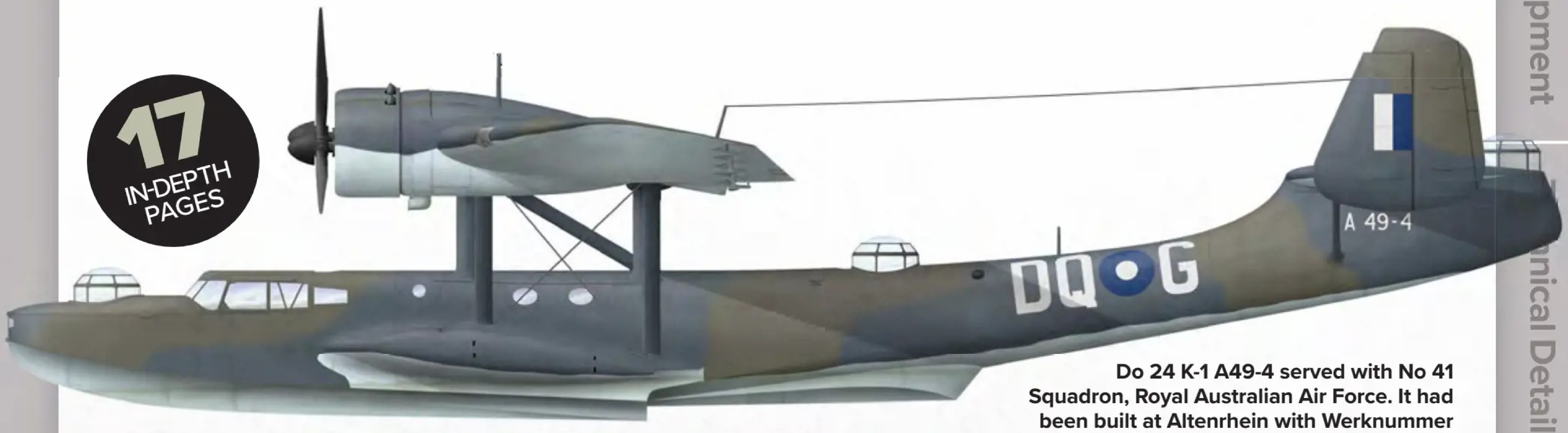
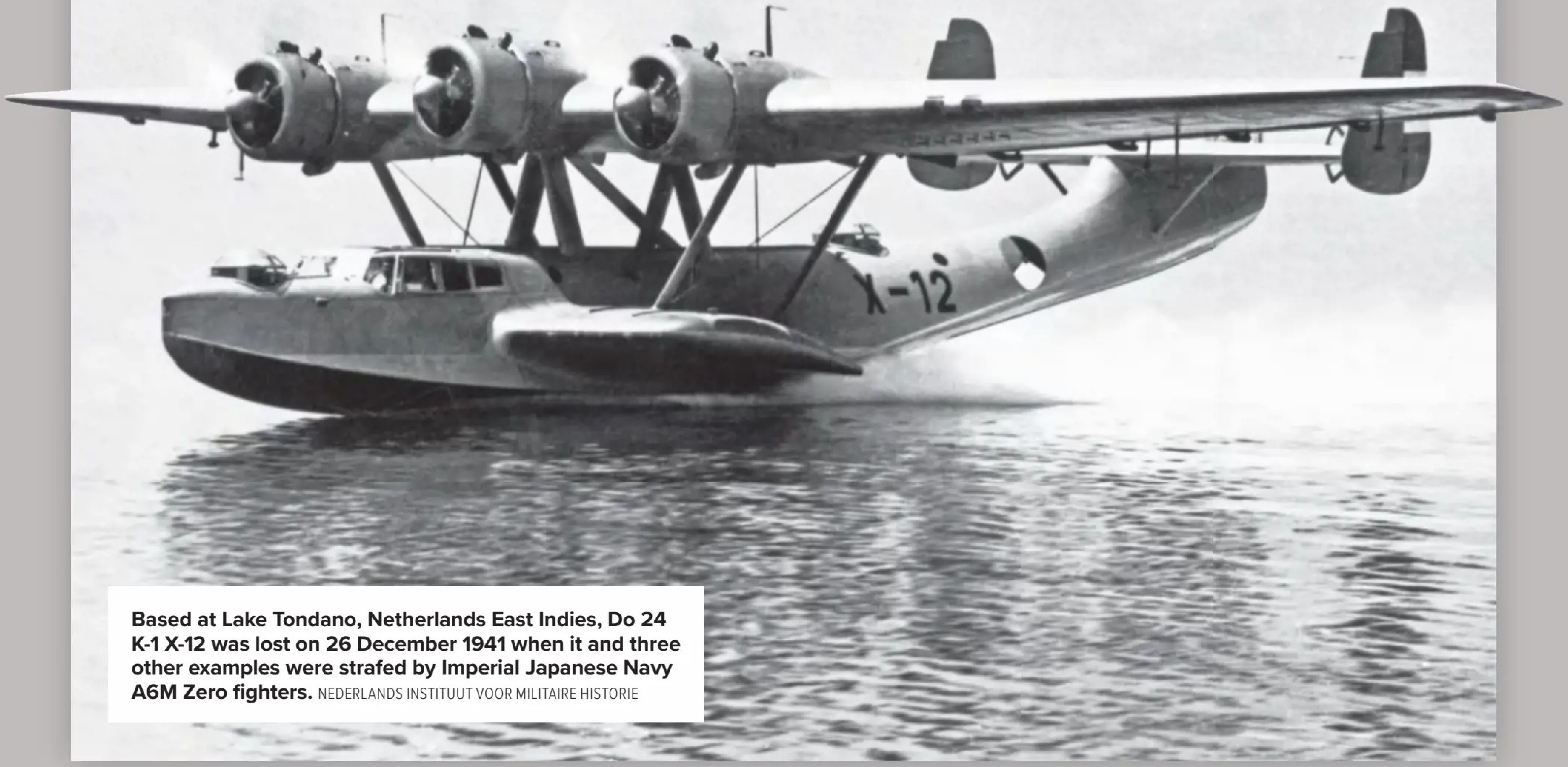


Do 24 K-1 A49-4 served with No 41 Squadron, Royal Australian Air Force. It had been built at Altenrhein with Werknummer 769 as part of the second Dutch order, and was operated by the Royal Netherlands Navy as serial X-9 before its transfer to the RAAF. CHRIS SANDHAM-BAILEY

DORNIER Do 24

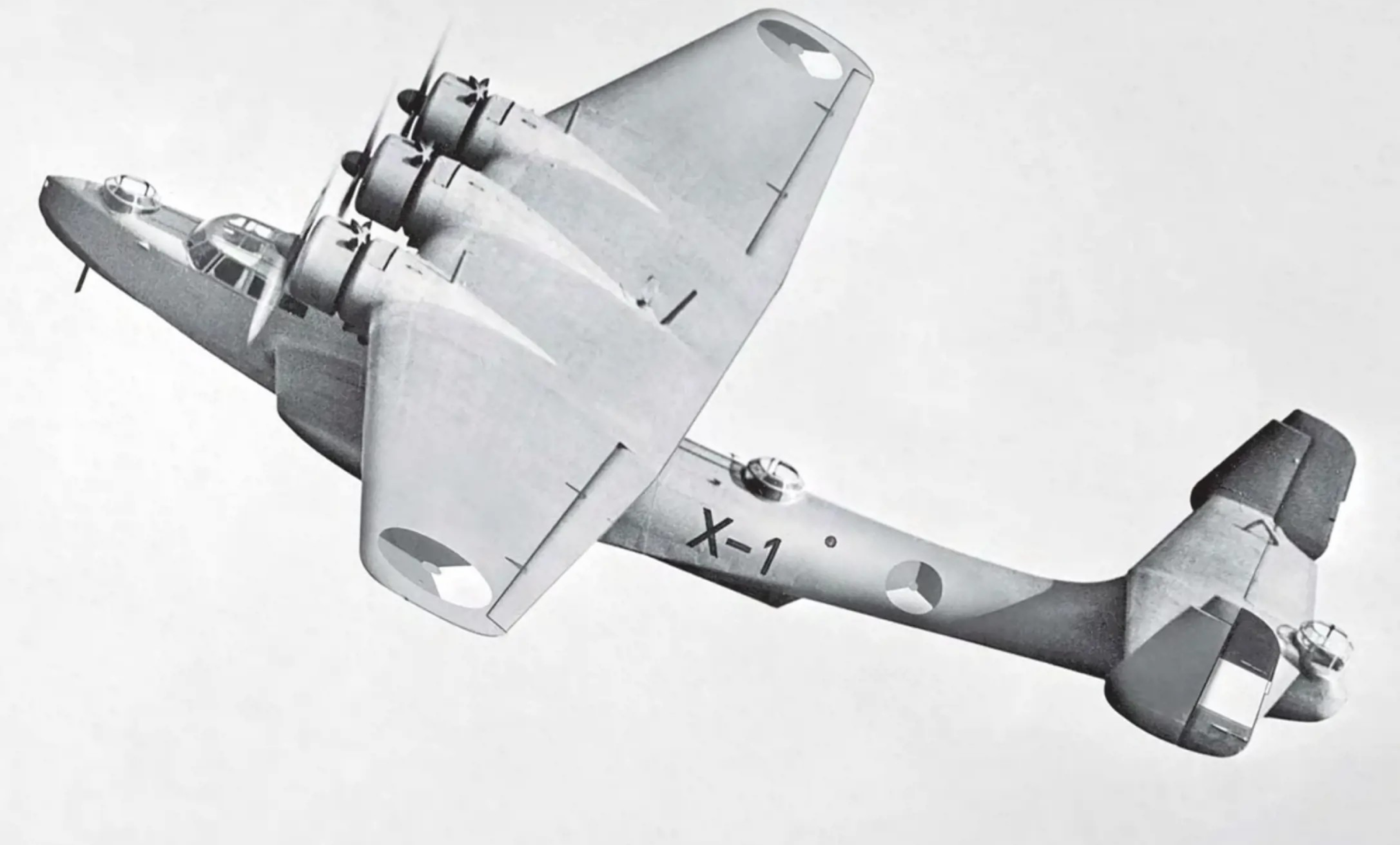
WORDS: JAMES KIGHTLY



Based at Lake Tondano, Netherlands East Indies, Do 24 K-1 X-12 was lost on 26 December 1941 when it and three other examples were strafed by Imperial Japanese Navy A6M Zero fighters. NEDERLANDS INSTITUUT VOOR MILITAIRE HISTORIE

Uncertain beginnings led on to Dornier's most successful flying boat

Having been the first Do 24 to fly, the V3 prototype became serial X-1 in Marine Luchtvaartdienst service.
NEDERLANDS INSTITUUT VOOR MILITAIRE HISTORIE



Claude Honoré Désiré Dornier was born on 14 May 1884 in Kempten, Allgäu to a French father and a Swabian mother, and gained his father's French citizenship rights. He studied mechanical engineering at the Technische Hochschule München, qualifying as a Diplom-Ingenieur in 1907. As well as re-establishing his father's wine business, he developed knowledge in the metal industry and brought that expertise to Count Zeppelin in 1910 to carry out static calculations at the airship construction company in Friedrichshafen. Dornier acquired German citizenship in 1913, at the request of the Count, but still retained his French nationality.

On his own initiative, he investigated the use of metal instead of wood for aircraft construction and in due course established Dornier Metallbau in Manzell near Friedrichshafen in 1922. After designing, building and patenting the revolving Zeppelin shed, Dornier's research into metal construction methods led to a long series of generally successful, often pioneering, all-metal flying boats.

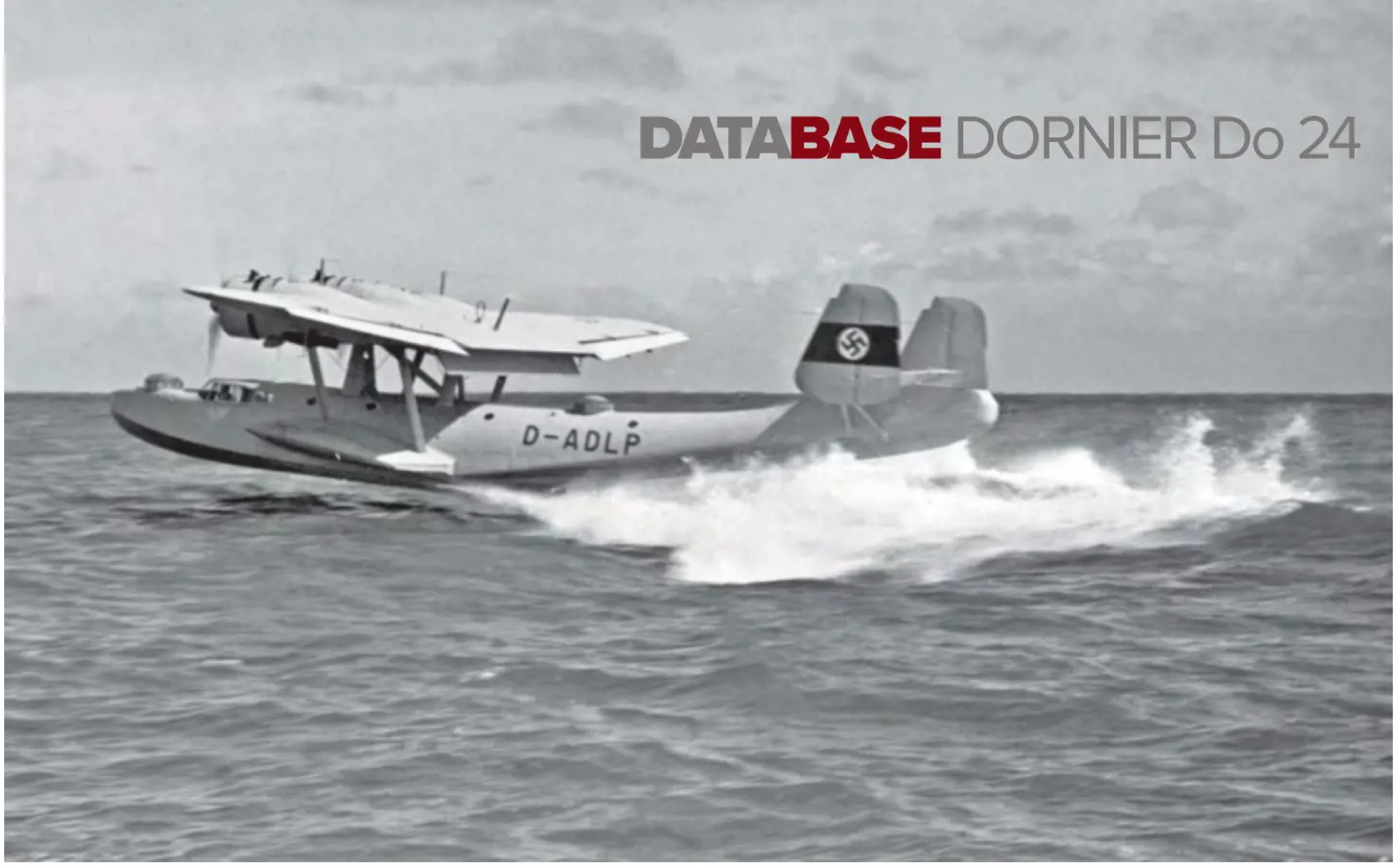
In the mid-1930s, the Dornier company and Richard Vogt of Hamburger Flugzeugbau — part of, and later renamed as, Blohm und Voss — developed designs for a particularly challenging Reichsluftfahrtministerium (RLM, German Ministry of Aviation) requirement for a long-range maritime patrol and naval reconnaissance flying boat. With the expectation of open-sea operations, exceptional seaworthiness was fundamental, and to meet the range and performance requirements, excellent layout and streamlining would be essential.

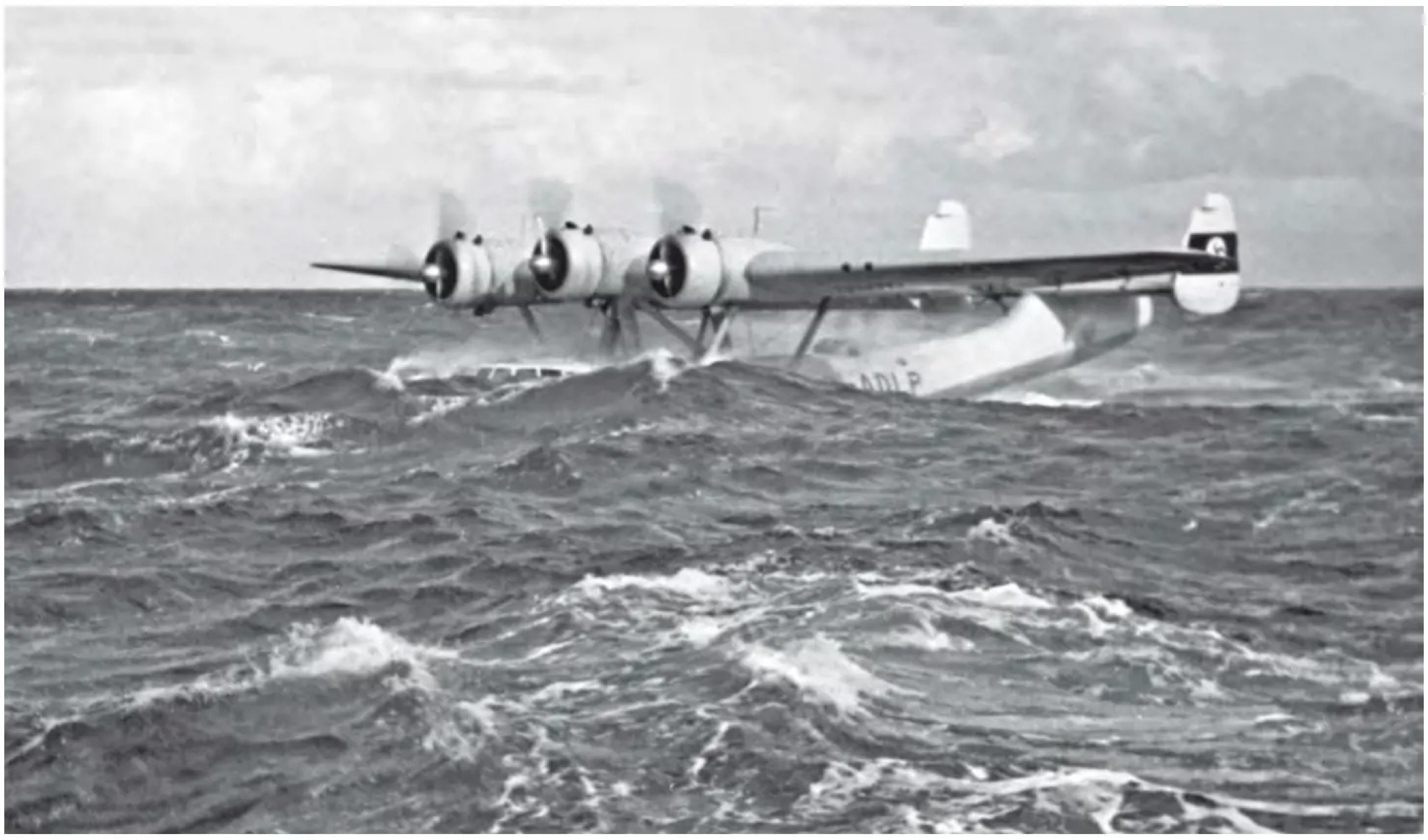
The Netherlands government opened discussions in 1935 with the Dornier company for an aircraft to replace its Dornier Wal (Whale) flying boats, then used by the Marine Luchtvaartdienst (MLD, Naval Air Service) in the Dutch colony of the Netherlands East Indies, today's Indonesia. The Wals had enabled significantly greater capability for Dutch naval activities in this Pacific region.

Dornier had already developed the design fundamentals of a parasol wing, carrying the engines above the sea spray, coupled with stability on the water through his 1923-patented 'Dornier-Stummel' (sponsons) on each side of the fuselage. The sponsons were also much less vulnerable to damage than the alternative wing-mounted floats. All of these design elements originated on Dornier's flying boat designs conceived during the Great War, and were vital to the success of the widely used, record-setting, Wal.

The Dutch specification in 1935 was issued by two officers in the country's Department of

> *“The Dutch were pleased the aircraft was fulfilling their brief”*





The Do 24 V3 was registered as D-ADLP when it conducted open-water testing in the North Sea in early September 1937. NEDERLANDS INSTITUUT VOOR MILITAIRE HISTORIE

Defence, J. N. Kramer and C. Sanders, the latter producing a drawing of his concept. The requirement ruled out the new, twin-engined Dornier Do 18, as it required a larger flying boat with three engines — none of them with pusher propellers — and a maximum speed of 315km/h. It also needed to operate independently away from a permanent base for protracted periods, something numerous air arms had discovered was viable in the 1920s, and an effective way of 'showing the flag' more widely as part of colonial policing.

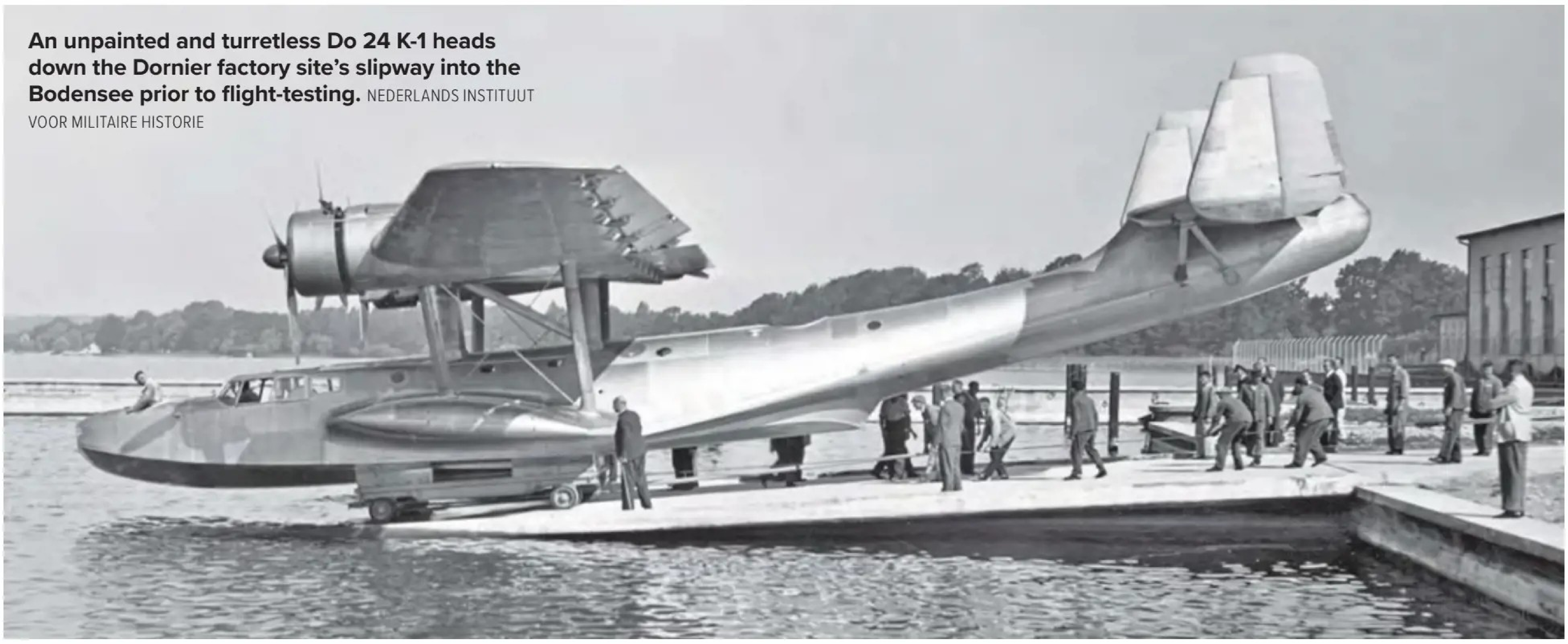
The Dornier project was known as the P14. Competition came from Sikorsky and Fokker. The Fokker proposal looked like a tri-motor Supermarine Scapa and was offered in two versions: one with sponsons, designated as the BV, and the other with wing floats, dubbed the BVa. The MLD, however, judged Fokker would not be able to meet the required timescale.

After Dornier supplied details and a large-scale proof of concept model to the MLD, on 3 August 1936 an order for six flying boats — allocated the RLM code Do 24 — was placed, the aircraft to be numbered X-1 to X-6. This, incidentally, resulted in the Dutch nickname of 'X-boats'. The deal was unusual in a period when Hitler's Germany was arming for war, and doubly surprising because the type was not favoured by the RLM, which preferred the Blohm und Voss Bv 138 as a Hochseefähiger Fernaufklärungsflugboot (ocean-going reconnaissance flying boat).

Two Do 24s were reluctantly ordered for evaluation by the RLM's Technisches Amt (technical office) as a back-up to the Bv 138. These were the first two prototypes, V1 and V2, powered by three 600hp Junkers Jumo 205C diesel engines, as required by the ministry. Despite a relatively poor power-to-weight ratio, they offered superior fuel consumption and thus relatively greater range. The third prototype, the V3 — which was the first to fly — and the fourth, the V4, were equipped with 875hp Wright R-1820-F52 Cyclone radials, which had been requested by the Dutch. This engine had been selected for compatibility with the Martin 139WH bomber, the specified export model of the revolutionary Martin B-10, as ordered for the Militaire Luchtvaart van het Koninklijk Nederlandsch-Indisch Leger (ML-KNIL, Air Division of the Royal Netherlands East Indies Army) as well as the MLD's Fokker TIV floatplanes. It was part of a major modernisation of the Dutch military in Asia.

The Do 24 V3 made the type's successful first flight on 3 July 1937, following high-speed taxi trials on Lake Constance, otherwise known as the Bodensee, in the hands of Erich Gundermann. Registered as D-ADLP — as, confusingly, was the V4 — it was initially used for open-water testing in the North Sea between 5 and 13 September, with impressive results. The Dutch were pleased the aircraft was fulfilling their demanding brief, and more. This positive response was a contrast to continued indifference from the RLM, despite the radial-engined Do 24s demonstrating performance that significantly exceeded the specified requirements, being economical in cruise and meeting the required range in excess of 3,000km below maximum take-off weight. Additionally, in the event of an engine failure, the aircraft had the ability to maintain height on partial loads. The clean, refined hull design afforded exceptional hydrodynamic performance for take-off, alighting and taxiing, and despite the low height of the hull, the volume of spray and water shipped over the fuselage was acceptable.

The Do 24 V1 and V2, equipped with the tall, in-line Jumo 205C engines for German use, flew in January 1938, the V1 registered as D-AIBE. They were tested at the seaplane test unit, the Erprobungsstelle See, at Travemünde, where performance was found inadequate due to the diesels' lower power. Unwanted, both Dornier prototypes were returned to Friedrichshafen for storage. Ironically, the RLM's preference for the Bv 138, likewise a diesel tri-motor, turned out to be even more problematic. A flawed concept, it needed a major hull redesign to achieve adequate hydrodynamic performance.


An unpainted and turretless Do 24 K-1 heads down the Dornier factory site's slipway into the Bodensee prior to flight-testing. NEDERLANDS INSTITUUT VOOR MILITAIRE HISTORIE

Production

Dornier received a follow-on contract on 22 July 1937, and the airframes up to serial X-29 were manufactured at Dornier's Altenrhein works in Switzerland as Do 24 K-1 models, because the German factories were not allowed to build export aircraft by the RLM. Unusually, each one was registered just for the delivery flight as D-AYWI. Dornier built one more, the only Do 24 K-2 completed, X-37. Licence-production was to switch to Aviolanda in the Netherlands, with the wings made by de Schelde and tail surfaces by truck-builders Verheul in Gouda. Only a few had been delivered before the German invasion of the Low Countries in May 1940.

Production was restarted under the control of German company Weser Flugzeugbau. Fokker was brought into the final assembly stage and, later, production. The Do 24 K-2 versions on the line were modified to the new Do 24 N-1 standard. The Wright Cyclone engines were retained on the first examples, but they were given German equipment and Luftwaffe-preferred instrumentation, the Dutch examples having instruments from the German Askania-Werke. Bomb racks were removed and MG 15 machine guns installed in place of the Dutch-specified Colt-Browning, while the Hispano-Suiza HS404 20mm cannon was retained in the amidships position. Two large hatches were added to the mid-fuselage port side, the aft one over the water, the forward one above the sponson, like a landing stage. No fewer than eight bunks could be incorporated. None of this came cheap, however, each aircraft costing nearly one million Reichsmarks.

Further licence-production was undertaken by the German-controlled Société Nationale des Constructions Aéronautiques du Nord (SNCAN) factory at Sartrouville, Paris, as Do 24 T-1 models. The first French aircraft was made from Aviolanda components, and delivered in October 1942. Ambitious plans for six aircraft to be delivered per month were never achieved, with the second following in January 1943 and 19 by the beginning of 1944. As well as unrealistic hopes for expanded production, totalling 127 aircraft, and the transfer of manufacture and tooling from SNCAN to Weserflug, the Germans intended the factory to switch to making sub-components of the Me 210 and 410 for Dornier in Munich. Work stopped with the liberation of France.

In December 1944, a report by Lt M. A. Boit, US Navy Reserve, stated, "There are enough materials available for the construction of thirty ships, including spare parts. At present there is a standing order of twenty ships for the French Navy". Noting there were not enough Bramo 323 powerplants, however, Boit added, "stocks of these engines are still being uncovered in France."

Do 318

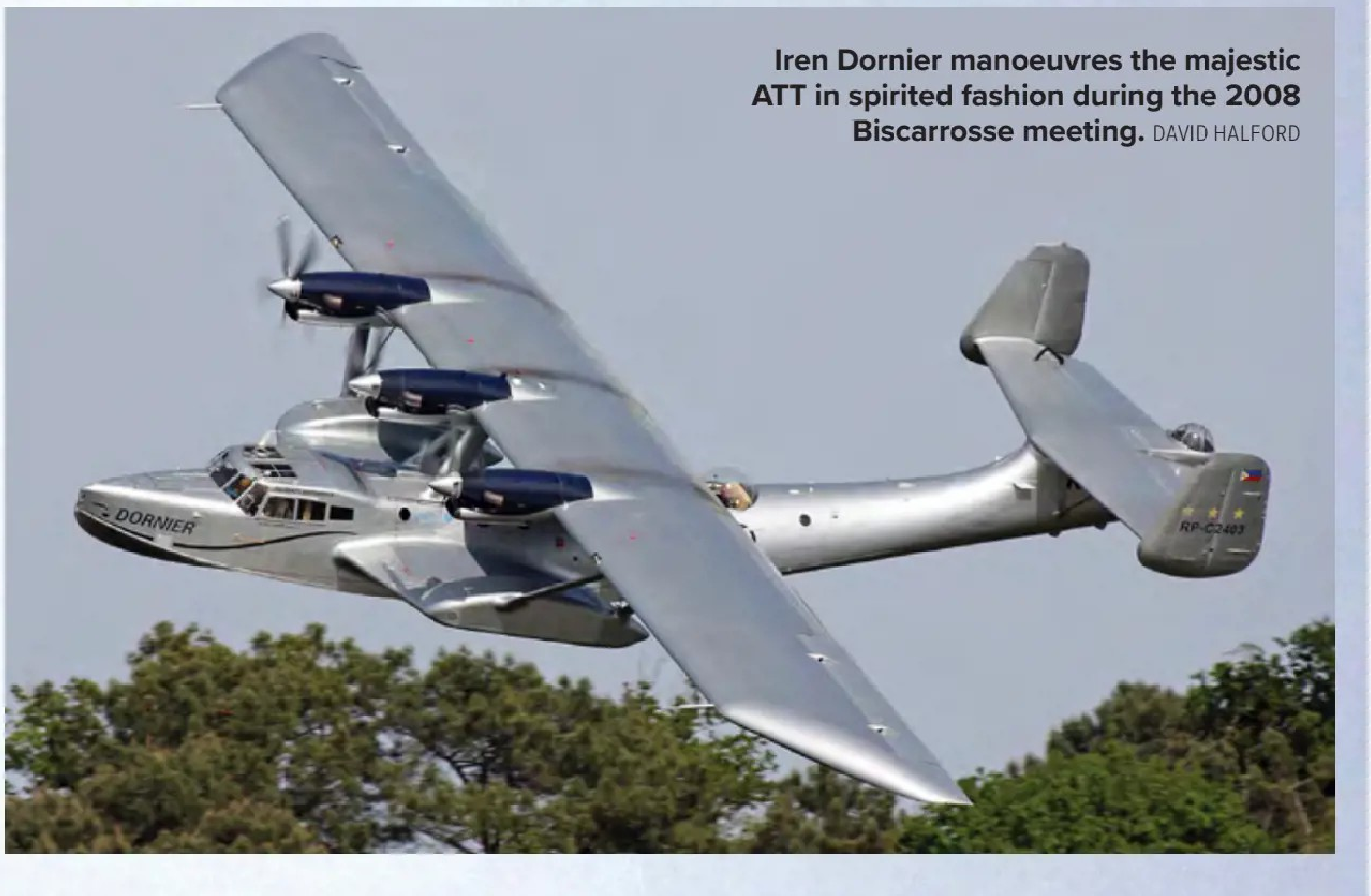
An improved version, the Do 318, was drawn up. A lengthened, raised forward fuselage and larger sponsons allowed a higher take-off weight and increased fuel capacity for the BMW-Bramo 323TA engines, each capable of 1,200hp. A cellular-section double keel provided safer reserve buoyancy. Take-off weight would be 18,000kg for open-sea rescue operations and 20,000kg for reconnaissance missions.

To counter the added weight, a boundary layer suction system was developed, and in 1943-44 a standard Do 24 was modified by Weser Flugzeugbau to incorporate an Arado-designed kit. A Walter generator blew air over the flaps to increase lift for an even shorter take-off and alighting. Sources disagree on whether the system was tested on Lake Constance, or if the new wing design was fitted but not flown. One Dornier was adapted for the minesweeping role by Weserflug and fitted with a degaussing ring, but no more were adapted.

The Junkers Jumo 205C diesel-powered Do 24 V1 gave quite significant trouble.

DATAFILE

THE ULTIMATE Do 24



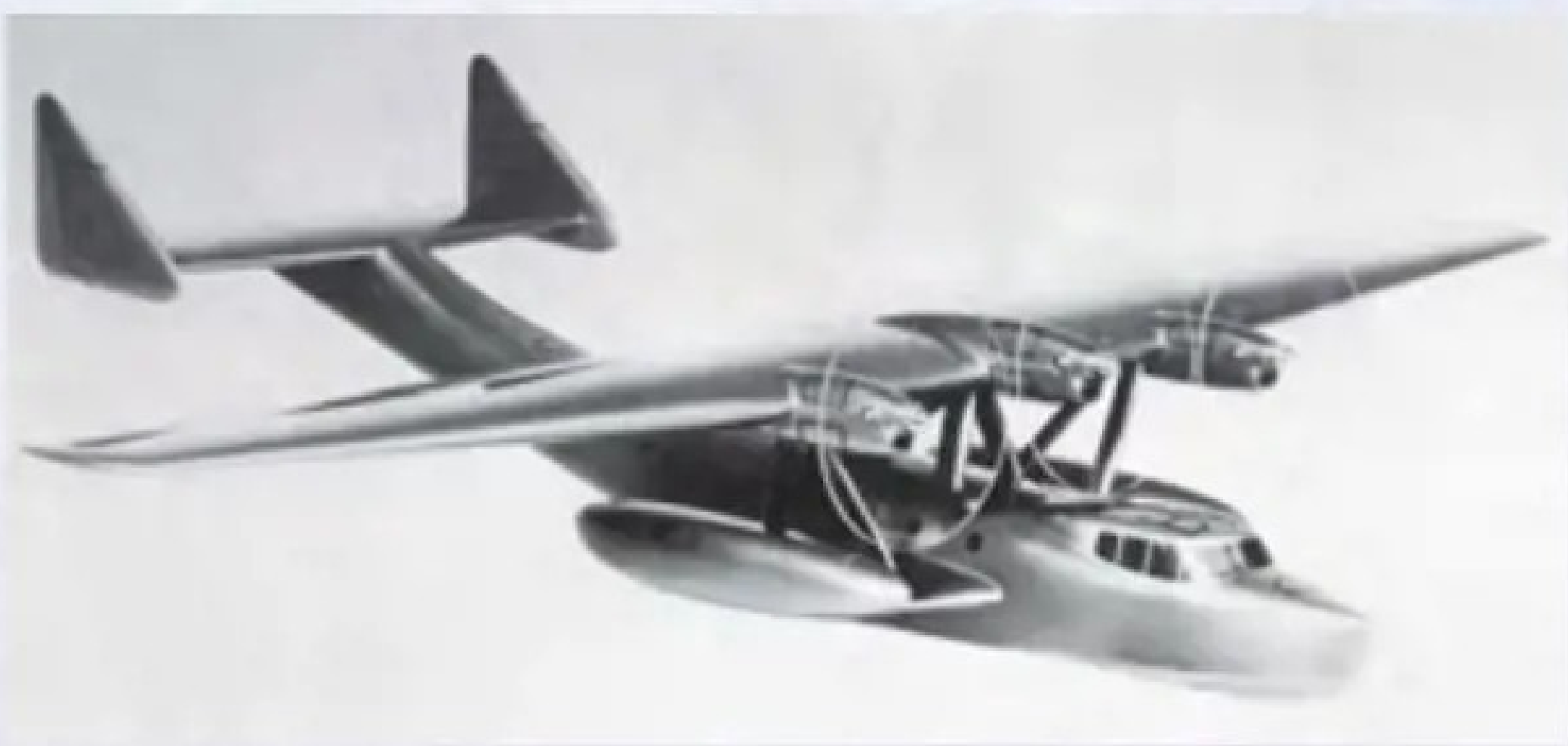
Iren Dornier manoeuvres the majestic ATT in spirited fashion during the 2008 Biscarrosse meeting. DAVID HALFORD

The post-war Dornier company repeatedly attempted to attract interest in developments of the Do 24, whether new-production or even remanufactured. In 1972, not long after retirement of the final Spanish examples, a model of an advanced turboprop amphibian, the Do 24/72, was presented at the Paris Salon. It was intended primarily for search and rescue tasks. Dornier proposed the less ambitious Do 24 A in 1978, but could not find partners, though CASA and Aérospatiale were approached.

An updated design was realised in the Do 24 ATT, an experimental one-off sponsored by the Bundesministerium für Forschung und Technologie (Federal German Ministry of Research and Technology) as part of the Gesamtprogramms Luftfahrtforschung und Luftfahrttechnologie (General Aeronautical Research and Technology Programme). ATT stood for Amphibischer Technologie-Träger, or amphibious technology testbed, though the aircraft was first known as the Do TT and 24 TT. An ex-Spanish Do 24 T-3's hull and empennage, with a raised cockpit, were mated with a new-technology wing similar to that on the Dornier 228, three Pratt & Whitney Canada PT6A-45 turboprops of 1,125shp each and a retractable tricycle undercarriage, using the Do 31 VTOL jet transport's main gear and Fokker F27 nose gear. It was the first amphibian example of the type, and flew on 25 April 1983 as D-CATD. Although only 150 flight hours were authorised, the aircraft conducted open-sea trials up to sea state 4 in 1984 before retirement to Dornier's own collection at Oberpfaffenhofen, and then a loan to the Deutsches Museum at Schleißheim.

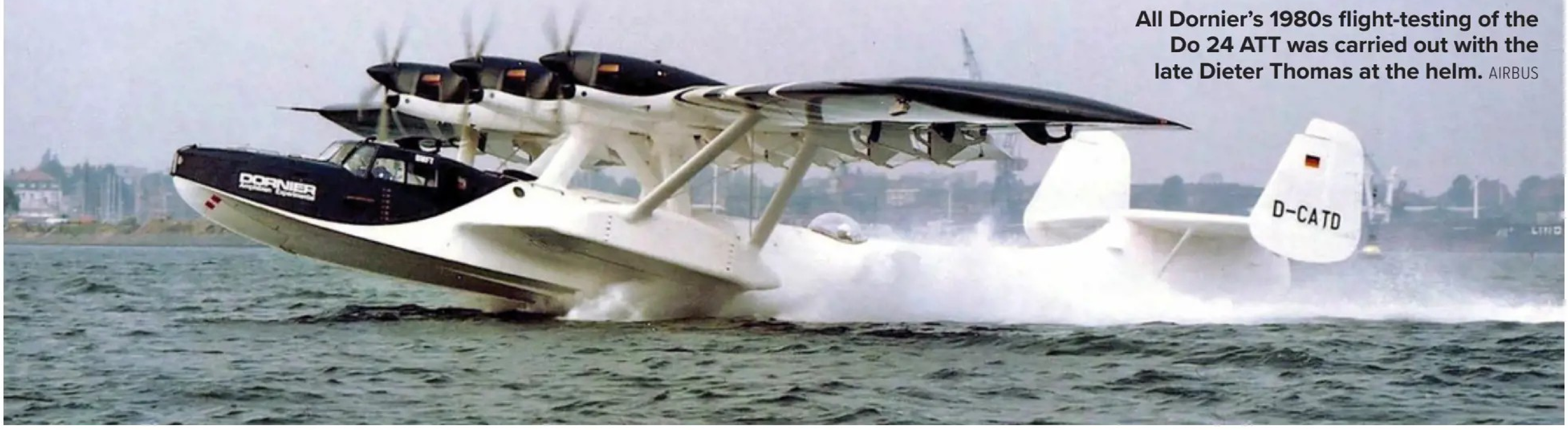
But that wasn't the end. Iren Dornier, grandson of Claudius, conceived his 'mission dream' with the Do 24 ATT. "I wanted to recall the work of my grandfather, who played an exceptional part in aviation history", he explained to Ben Dunnell in 2004; "to re-fly some of the routes that he did initially with the Dornier Do X."

He acquired the Do 24 ATT in 2001, and the dismantled aircraft was shipped via Antwerp to his airline Seair's base in the Philippines during 2003: "The restoration was a tremendous logistical effort. There was a lot of documentation, a lot of work with the aviation authorities… Of course, all the documentation is in German so I had no-one helping me with that other than myself! I had to be the engineer and the project leader. I worked with my guys — about 15-20 people — literally night and day to get it finished. It was good that we finished it in time for the celebrations of 100 years of powered flight."



The Do 24/72 design as presented at 1972's Paris Salon. KEY COLLECTION

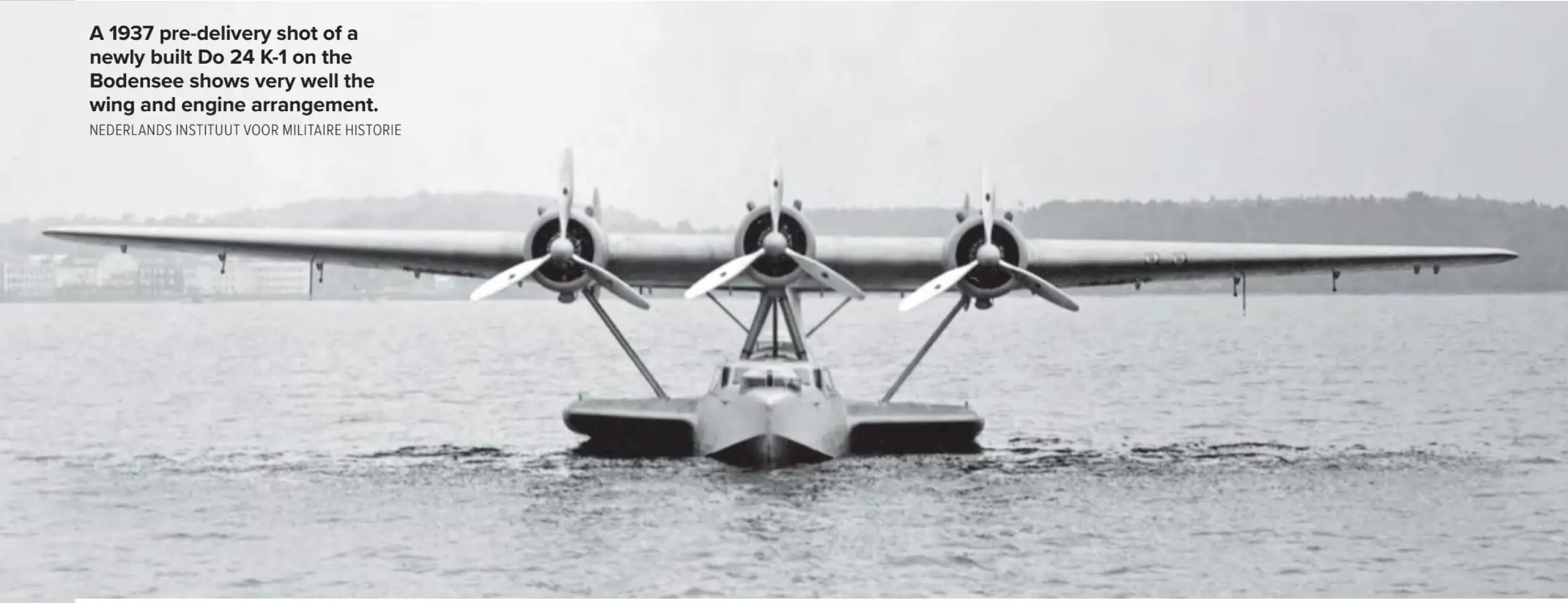
Registered as RP-C2403, it took to the air again on 18 November 2003, followed by rigorous land and sea testing. Iren flew it around the world during 2004 in support of UNICEF, on an eight-month trip visiting more than 30 countries. This campaign raised awareness not just of Dornier's heritage and the Do 24 type, but of large amphibian flying boats more generally. Re-registered as D-CIDO in 2011 and based at Oberpfaffenhofen near Munich, the ATT appeared on the water at various events. A mishap on the Wolfgangsee in Austria during 2015's Scalaria Air Challenge, when the aircraft hit flotsam during a touch-and-go and rotated to a sudden halt, caused hull damage which took some time to repair. Since 2021, this unique machine has been exhibited at the Dornier Museum in Friedrichshafen.



All Dornier's 1980s flight-testing of the Do 24 ATT was carried out with the late Dieter Thomas at the helm. AIRBUS

TECHNICAL DETAILS

What were the key design features that made the Do 24 so good?



A 1937 pre-delivery shot of a newly built Do 24 K-1 on the Bodensee shows very well the wing and engine arrangement.
NEDERLANDS INSTITUUT VOOR MILITAIRE HISTORIE

The Do 24 was an all-metal Duralplat (Duralumin)-covered semi-stressed skin parasol monoplane with a shallow, broad-beamed hull, upswept at the rear with a twin tail, a two-step Dornier-specific planing hull, and integral Dornier sponsons for stability. Three engines were fitted with enclosed cowls on the wing leading edges, and it had three fully enclosed gun positions along with a fully glazed cockpit.

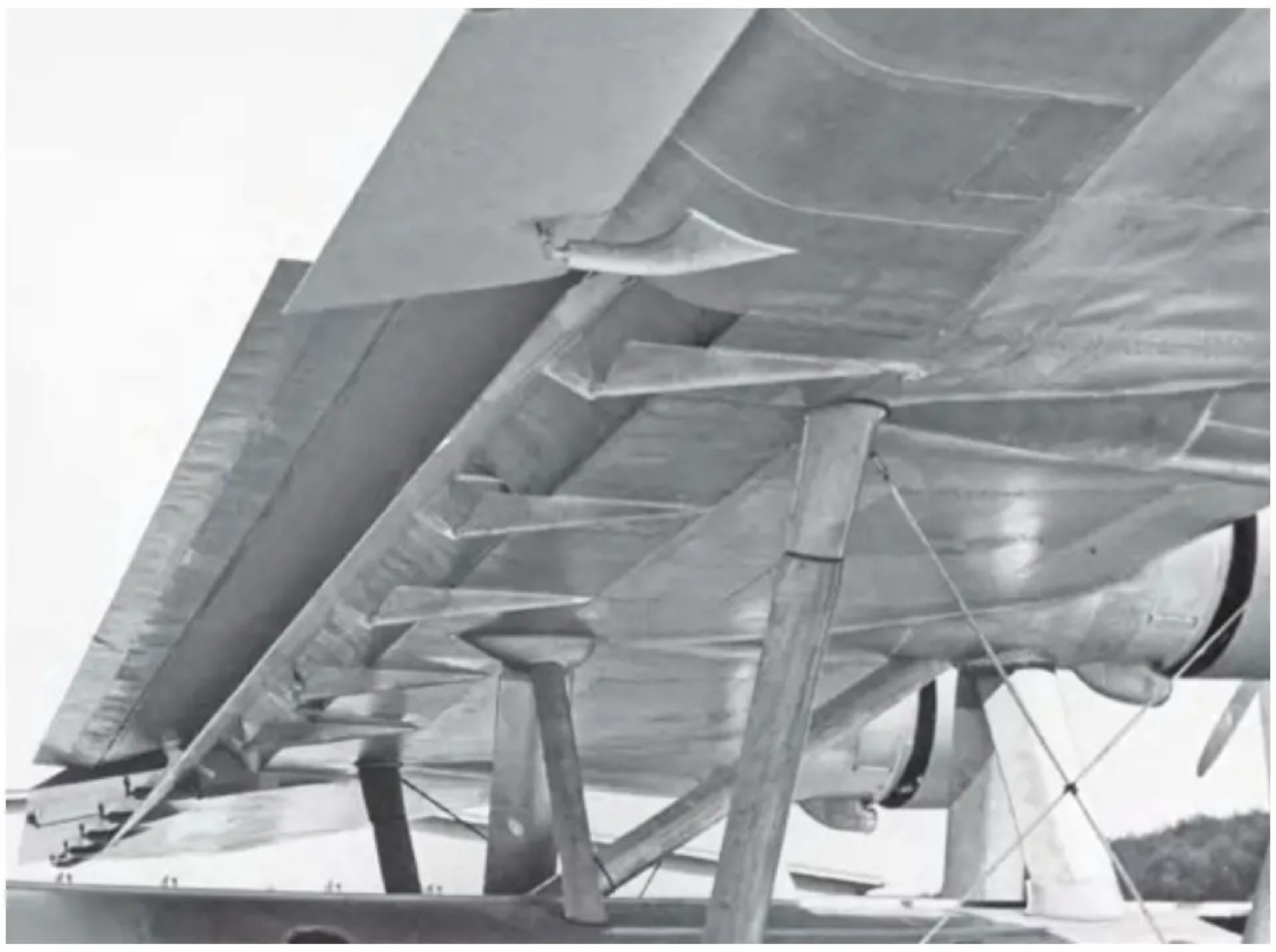
The wing was supported above the fuselage by a pair of inverted-V struts to the fuselage, with subsidiary strut and wire bracing between and from the sponsons to the outer wing. It consisted of a rectangular centre-section which carried three engines, the centre engine mounted higher than the outboard, with two trapezoidal outer wing sections.

The whole wing trailing edge could be adjusted for greater lift, with a full-width centre-section split flap, and the outer sections' full length took in slotted ailerons that could also be lowered as flaps. The centre engine nacelle featured access for hoisting equipment. The empennage had twin static and aerodynamically balanced, fabric-covered rudders and a pair of elevators, likewise balanced, with a tail gun position located aft.

> *“The centre engine was mounted higher than the outboard ones”*

The hull was divided, with watertight hatches and bulkheads in the main fuselage sections, into nine separate compartments. These were the bow, cockpit, radio and navigation room, flight engineer station, two cargo/crew compartments, centre turret/galley and two aft compartments. The amidships cabins were equipped with bunks and equipment related to the specific role, while compartment VIII had a toilet and marine equipment. Water rudders were not required, replaced by differential power on the outboard engines.

Main access was through a small hatch aft into the flight engineer position, but also through the forward turret (used for mooring) or a sliding hatch in the cockpit roof. Later examples had two large rescue/cargo hatches on the port side. These, hinged on



Having the entire wing trailing edge adjustable for greater lift helped give the Do 24 excellent low-speed handling characteristics.
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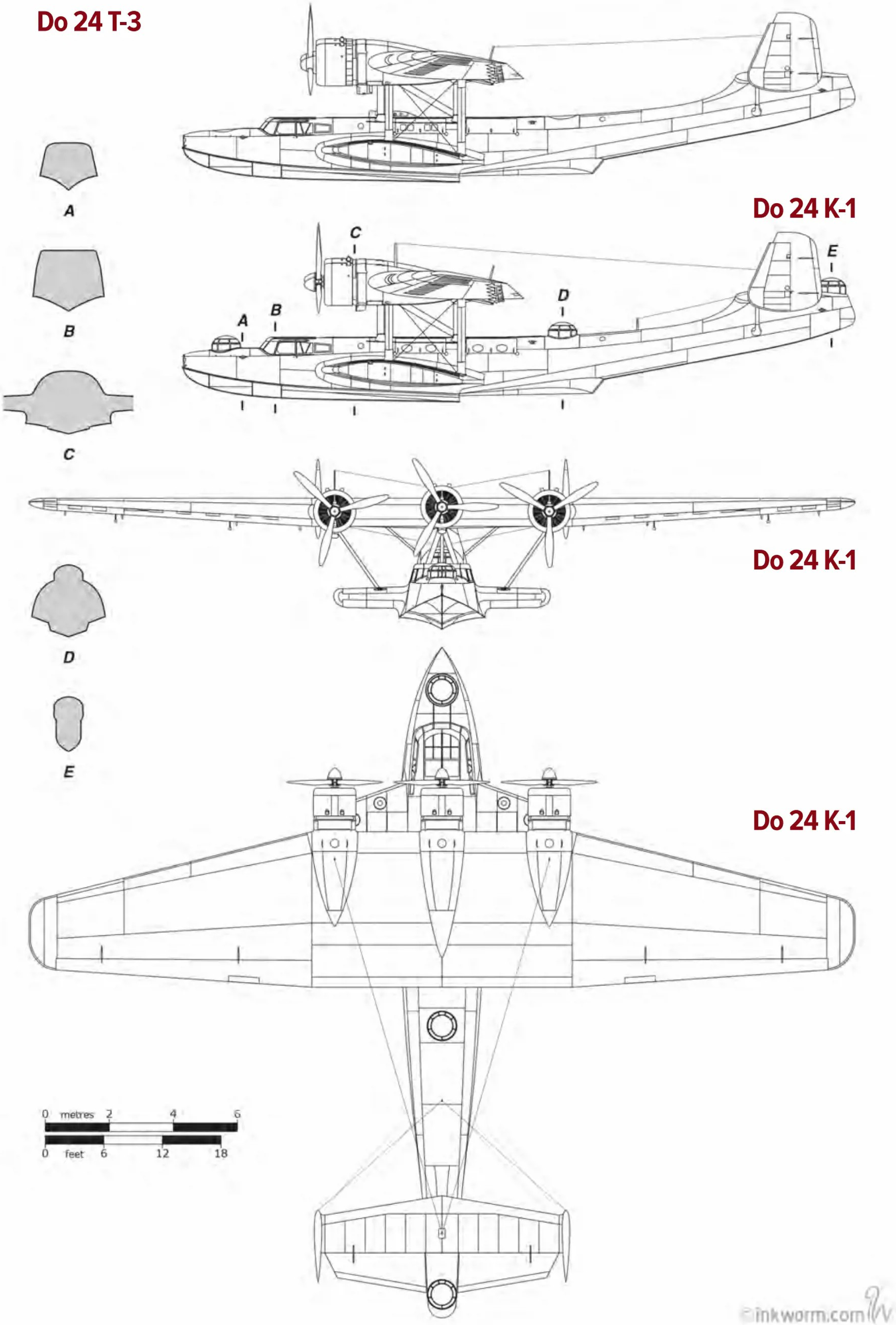
DATAFILE SPECIFICATIONS: Do 24 T

POWERPLANTS	
Three BMW-Bramo 323R-2 Fafnir nine-cylinder radials, 1,000hp each	
DIMENSIONS	
Length:	21.95m (72ft 0.5in)
Span:	27m (88ft 7in)
Height:	5.75m (18ft 10.5in) on ground, including propeller blades
Wing area:	108 sq m (1,162 sq ft)
PERFORMANCE	
Top speed:	340km/h at 3,000m (211mph at 9,840ft)
Cruise speed:	220km/h (137mph)
Range:	2,900km (1,802 miles)
Ferry range:	4,700km (2,900 miles)
Service ceiling:	7,500m (24,600ft)
WEIGHTS	
Empty weight:	9,200kg (20,286lb)
Maximum take-off:	18,400kg (40,565lb)


Do 24 T-3
Do 24 K-1
A
B
C
D
E
Do 24 K-1
Do 24 K-1
0 metres 2 4 6
0 feet 6 12 18
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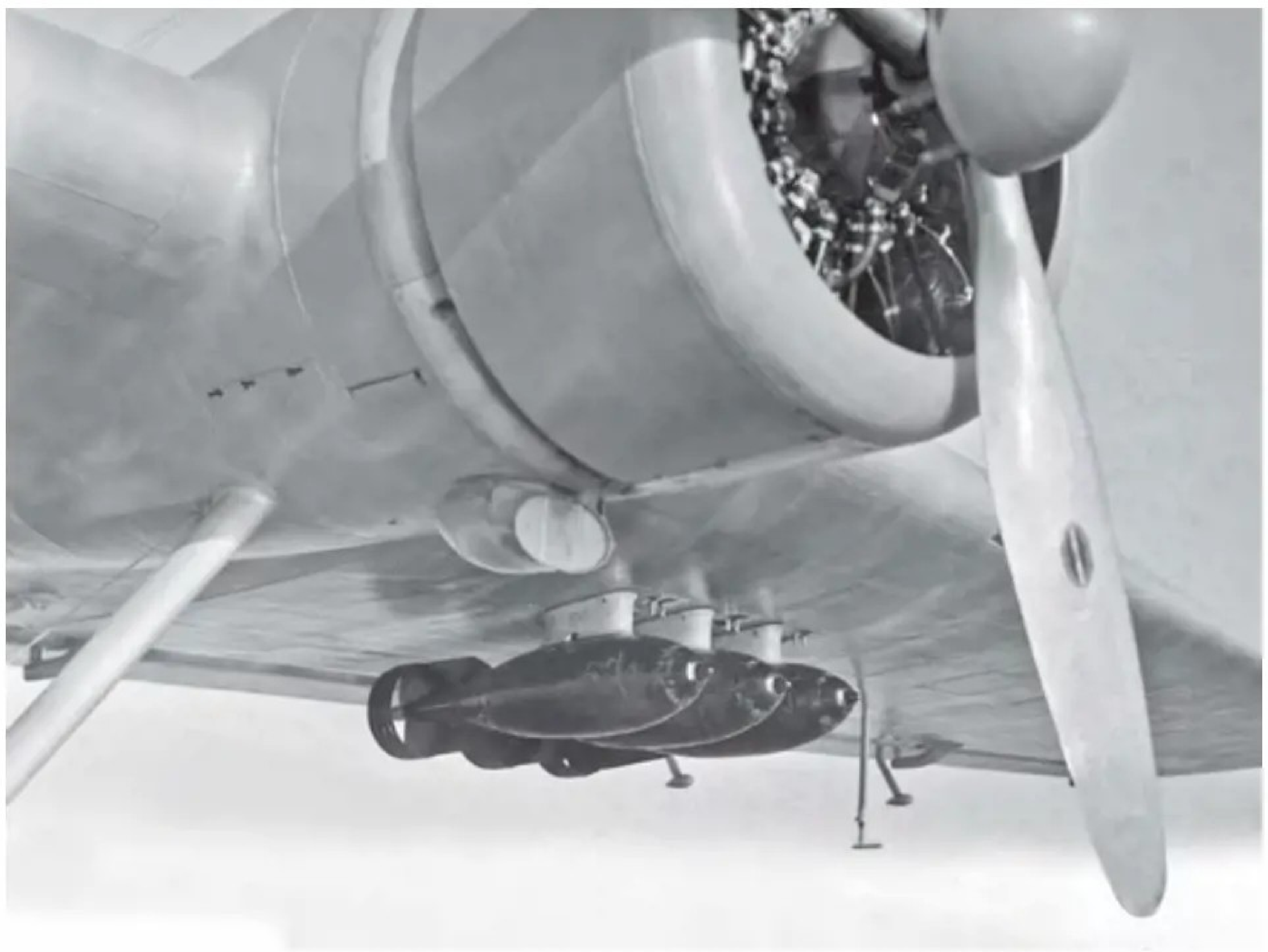
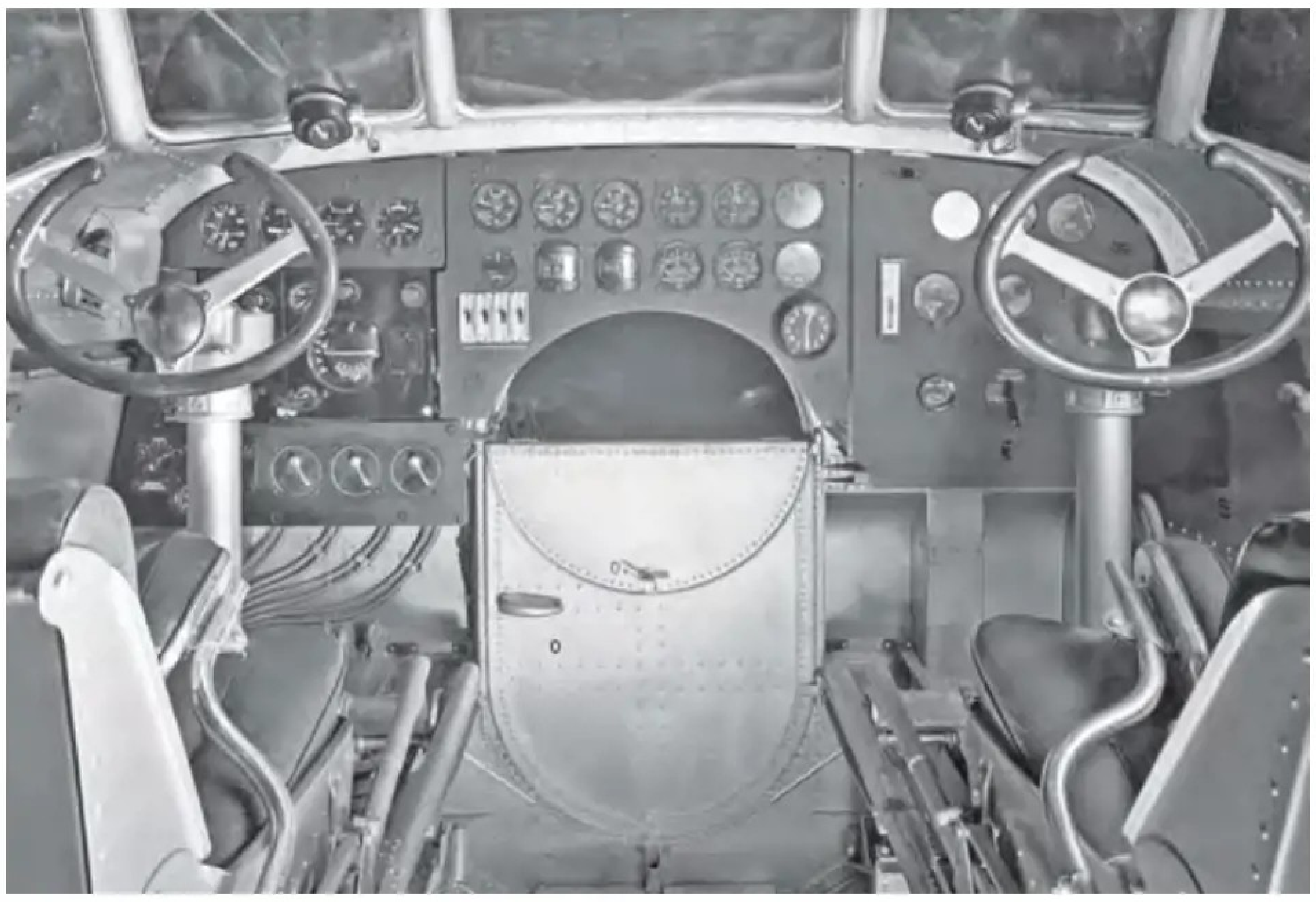
DATAFILE

PRODUCTION AND VARIANTS

Exact production numbers are unknown, due to the loss of records and the extent of sub-contracted assembly. Aviolanda produced more than 170 examples, Fokker between 25 and 30, and SNCAN 40, including the first from components supplied by Fokker. Total production is believed to be nearly 300 aircraft.

Designation	Number built	Details
Do 24 V1 and V2	2	German Dornier-built Luftwaffe prototypes, Werknummer 760 and 782; three 600hp Junkers Jumo 205C liquid-cooled diesel in-line engines
Do 24 V3 and V4	2	German Dornier-built Dutch prototypes, Werknummer 761 and 762, both registered D-ADLP sequentially, then serials X-1 and X-2; three 875hp Wright R-1820-F52 Cyclone air-cooled radial engines
Do 24 K-1	36	Swiss production by Dornier; three 875hp Wright R-1820-F52 Cyclone engines; three Colt-Browning 7.7mm machine guns in the first 10, then new middle turret with one Hispano-Suiza 20mm cannon
Do 24 K-2	1	Swiss Dornier-built; three 1,000hp Wright R-1820-G105 Cyclone engines; equipment and detail improvements from K-1; two Colt-Browning 7.7mm machine guns, one Hispano-Suiza 20mm cannon
Do 24 N-1	13	Incomplete Dutch-built K-2s completed for the Luftwaffe for air-sea rescue; first 10 powered by three 1,000hp Wright R-1820-G102 Cyclone engines; two 7.92mm MG 15 or 13mm MG 131 machine guns, one Hispano-Suiza 20mm cannon (later Mauser MG 151/15 20mm cannon)
Do 24 T-1	11(?)	Dutch-built for German air-sea rescue/transport use; as N-1; re-engined with three 1,000hp BMW-Bramo 323R-2 Fafnir engines
Do 24 T-1	40	SNCAN French production of T-1; three 1,000hp BMW-Bramo 323R-2 Fafnir engines; post-war examples unarmed
Do 24 T-2	38(?)	Dutch-built for German air-sea rescue/transport use; as T-1 with minor changes to equipment
Do 24 T-3	More than 59	Fokker-built; as T-2; included 12 for Spanish use





TOP: A trial underwing bomb installation on a Do 24K-1. NEDERLANDS INSTITUUT VOOR MILITAIRE HISTORIE

ABOVE: The cockpit was the second of nine sections into which the Do 24's fuselage was divided. NEDERLANDS INSTITUUT VOOR MILITAIRE HISTORIE

the top edge to the main cargo compartments, could be fitted with a demountable hoist jib, for loading freight.

All but the V1 and V2 were powered by radial engines. Fuel was carried in two main fuel tanks in the wings, each of 940 litres, and the sponsons had three (early Do 24s only) or four tanks per side of 300, 300, 350 and 380 litres each, with oil tanks behind each engine.

The aircraft was normally flown by five or six crew. These were designated in Dutch service as pilot, navigator and three gunners, with the gunners doubling as radio operator and flight engineer, or second pilot. Standard German Seenotdienst crews comprised a pilot, aircraft commander who doubled as an observer and navigator, radio operator, two flight engineer/gunners and a tail gunner/paramedic.

The first Dutch machines (serials X-1 to X-12) had a single 7.9mm machine gun in each Alkan turret position, but from X-13 onward a Hispano 20mm cannon was fitted in a French SAMM turret. The powered centre gun position in Dutch and German models was equipped with a 20mm Hispano-Suiza cannon or a 20mm MG 151 cannon, the latter with a Revi E2A gunsight.

Bomb racks were mounted outboard of the engines. The Dutch machines had provision for up to 12 underwing bomb racks, to carry four 300kg, six 200kg or 12 50kg weapons. The maximum external load tested pre-war was 2,000kg of stores. The German transport types were rated for 1,200kg of bombs.

As a patrol and rescue platform, the Do 24 excelled

Netherlands East Indies

The colonial Netherlands East Indies, now Indonesia, comprised thousands of islands straddling the equator north of Australia. The Marine Luchtvaartdienst had rapidly developed its capability and operations to ensure the Dutch presence in the colony was seen responding to increasing tensions caused by expansionist Japanese activities in the Pacific.

In December 1941, the MLD had 34 Do 24 Ks spread across the archipelago, such as three at Sorong in the north-west of Dutch Papua New Guinea, and three at Ternate. One Do 24 crew, flying X-21, had undertaken a cruise of 12,000km (7,500 miles) in June 1939. Dutch naval aircraft in the area patrolled more than five million square kilometres of the oceans and islands between September 1939 and December 1941. The Dorniers were able to operate from six seaplane bases outside Java itself, plus 51 auxiliary bases with some facilities and another 153 bare marine landing sites which were mapped and usable.

A Dutch training school for pilots and observers was established in 1925 at the Morokrembangan naval air station in Soerabaja. On an extensive and well-equipped modern base, it was equipped with Ryan STM floatplanes, and Fokker CVII-W and TIV, Dornier Wal and Do 24 K flying boats. Attacked by the Japanese on 3 February 1942, three of the Dorniers were destroyed along with numerous other aircraft.

The Second World War in the Far East broke out in full force after Japan's 7 December 1941 attack on Pearl Harbor. The Japanese invasion force sent to land at Kota Bharu hours before the Pearl Harbor strike was discovered by a mixed force of a No 1 Squadron, Royal Australian Air Force Lockheed Hudson and Dutch Do 24s from Groep Vliegtuigen (Aircraft Group, GVT) 4 and GVT 8, precipitating the Dutch declaration of war on Japan.

In the air, the Dorniers could give a good account of themselves, though the accuracy of reporting varied. Several early encounters between Japanese 'fighters' — recorded as being Mitsubishi F1M2 'Pete' floatplanes and Mitsubishi G3M 'Nell' bombers — resulted in

A massed formation of MLD Do 24 Ks accompanied by Fokker TIV torpedo-bombers. NEDERLANDS INSTITUUT VOOR MILITAIRE HISTORIE

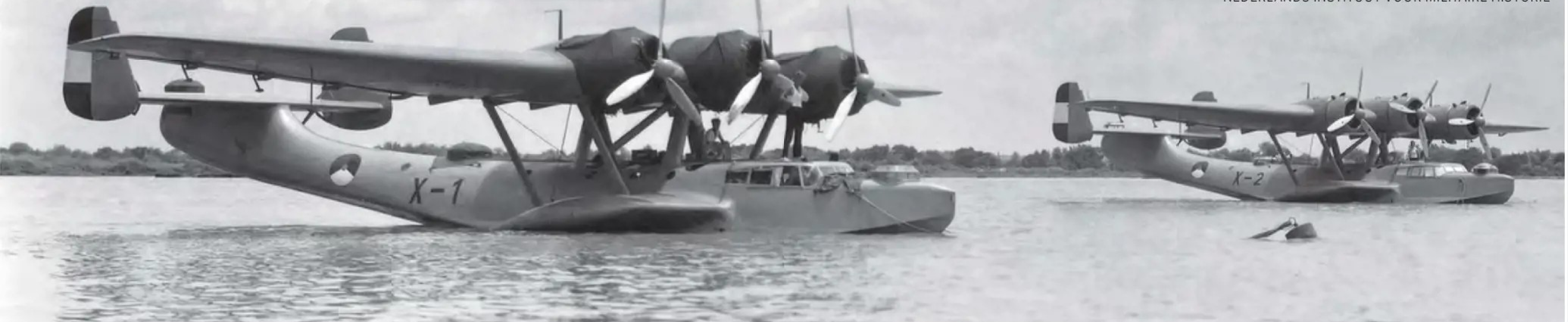
DATAFILE

THE BROOME TRAGEDY

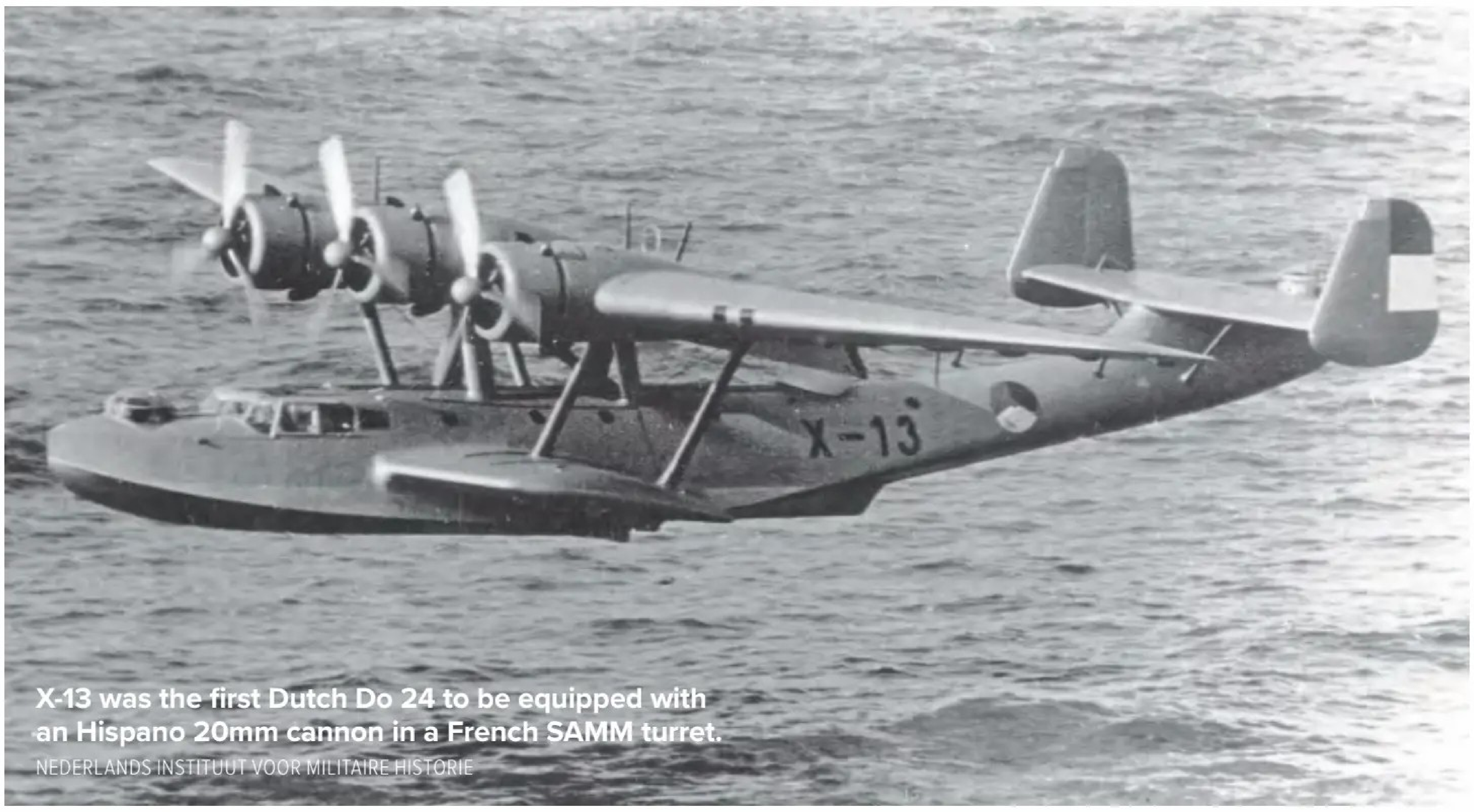
Dutch Dorniers X-1, X-3, X-20, X-23 and X-28 arrived in Broome, Western Australia, in the early morning of 3 March 1942, as part of a mass of escaping marine and land aircraft belonging to the Dutch, American and Australian forces and civil air services.

Due to the lack of accommodation, crews and refugees mostly remained on board the aircraft. At approximately 09.30, nine Zeros attacked Broome and the harbour. The Dorniers and Catalinas were the first to be fired upon and within minutes the aircraft were sunk or on fire. All the Do 24s were destroyed, among a total of more than 20 aircraft on the airfield and in the bays. Casualties were greatest among the flying boats, which had been quickly surrounded by burning oil. The official death toll was an estimated 70-80 people, but is almost certainly higher as no reliable listing of the refugees — men, women and children — was known.

There were two noteworthy escapes. X-36 landed west of Broome out of fuel, the crew escaping after destroying the aircraft. X-24 did likewise, but a Netherlands East Indies-operated Lockheed Lodestar landed at the Wallal sheep station airstrip and provided fuel from its own tanks to get the Do 24 through Broome to Perth.



X-1 and X-2, the initial pair of Do 24 K-1s in MLD service, following shipment to the Dutch East Indies.
NEDERLANDS INSTITUUT VOOR MILITAIRE HISTORIE



X-13 was the first Dutch Do 24 to be equipped with an Hispano 20mm cannon in a French SAMM turret.
NEDERLANDS INSTITUUT VOOR MILITAIRE HISTORIE

claims that some of the Japanese aircraft had been downed, with all the flying boat's ammunition expended. However, the sheer weight of Japanese numbers was telling against the light, dispersed western forces in the Pacific theatre.

Perhaps the type's most significant single combat victory was when, on 17 December 1941, Do 24 X-32 of GVT-7 attacked the 1,950-ton Imperial Japanese Navy Fubuki-class destroyer *Shinonome* in the vicinity of Miri, Sarawak. The ship was part of a mixed fleet which had landed its 2,500 troops unopposed during the night of 15-16 December, involved in Operation 'B', the Japanese invasion of British Borneo. Two of X-32's bombs hit the ship and another detonated alongside. The *Shinonome* exploded and sank with all hands.

On 22 December, X-35, commanded by Lt Piet Jaapies, took over shadowing a Japanese convoy from X-6 which had been damaged by an attacking Japanese fighter. Jaapies also spotted a submarine, which turned out to be the Dutch K XIV. His crew signalled to it the details of the convoy before drawing the 'Pete' floatplanes away, enabling K XIV to sink two transports and damage two more. With its hull leaking from the floatplane attack, X-35 was beached after landing, but could be flown to Surabaya the next day.

GVT 2 and GVT 5 launched a bombing attack on newly occupied Davao in the

Three of the MLD Dorniers take off after a visit in May 1941 to Darwin, Australia.
RAAF MUSEUM ARCHIVE VIA JAMES KIGHTLY

With Dutch destroyer HrMs *Banckert* in the background, Do 24 K-1 X-7 sits in Saleh Bay.
NEDERLANDS INSTITUUT VOOR MILITAIRE HISTORIE

DATAFILE

SECRET X-24

X-24 was used on clandestine flights after the rest of the Dutch Do 24s were passed to Australia. The aircraft, dubbed *de Ouwe Lobbes* (The Old Hound) and adorned with a Mickey Mouse cartoon, was assigned to the Netherlands Forces Intelligence Service for liaison with agents in former Dutch-occupied territory, flying from Darwin.

On 14 June 1942, the future commander of the Netherlands East Indies Army, Capt Simon Spoor, was flown in X-24 by Bastiaan Sjerp to the Wisselmeren (Wessel Lakes) in the central highlands of New Guinea, landing on the Paniaimeer (Lake Paniai) where explorer Dr Jean Victor de Bruyn had established a post. This was the first contact for six months, and was part of efforts to rebuild contacts on the islands and gather intelligence.

Just over a month afterwards, on 23 July 1942, another expedition flown by Lt Will Aernout was made to bring de Bruyn to Australia for medical treatment and debriefing. On the return flight, the aircraft ran short of fuel and the crew had to put down 90 miles west of Merauke. Getting fuel took three days. The hard-worked engines' increased consumption was a problem, and what proved to be the final mission for X-24 on 2 March 1943 was aborted before getting out of New South Wales, the aircraft being replaced by Catalina Y-45.

In service with the MLD-Detachement Australië, Do 24 K X-24, named *de Ouwe Lobbes*, begins its take-off run.
NEDERLANDS INSTITUUT VOOR MILITAIRE HISTORIE

Philippines on 20 December, with three Do 24s each. The second wave, from GVT 2, damaged the tanker *Tonan Maru No 2*. Dornier X-27 of GVT 5 tangled with a 'Pete' floatplane. The Do 24's gunner was wounded and the fuel tanks holed, forcing a landing, but the 'Pete's' float had been shot up, which caused it to crash on alighting. Lt Burgerhout landed X-30 in force 6 winds to rescue X-27's crew. A second raid was planned, but the aircraft earmarked for use were strafed by Mitsubishi A6M Zeros on the morning of 26 December before it could be carried out.

Another Dornier-versus-'Pete' battle occurred when X-32 found an F1M2 attacking the American ship *Ruth Alexander*, which was escaping from Manila. The Dornier damaged the Japanese aircraft badly enough that it sank on returning to its seaplane tender.

> *“The Dutch Dorniers were getting worn, damaged and running out of spares”*

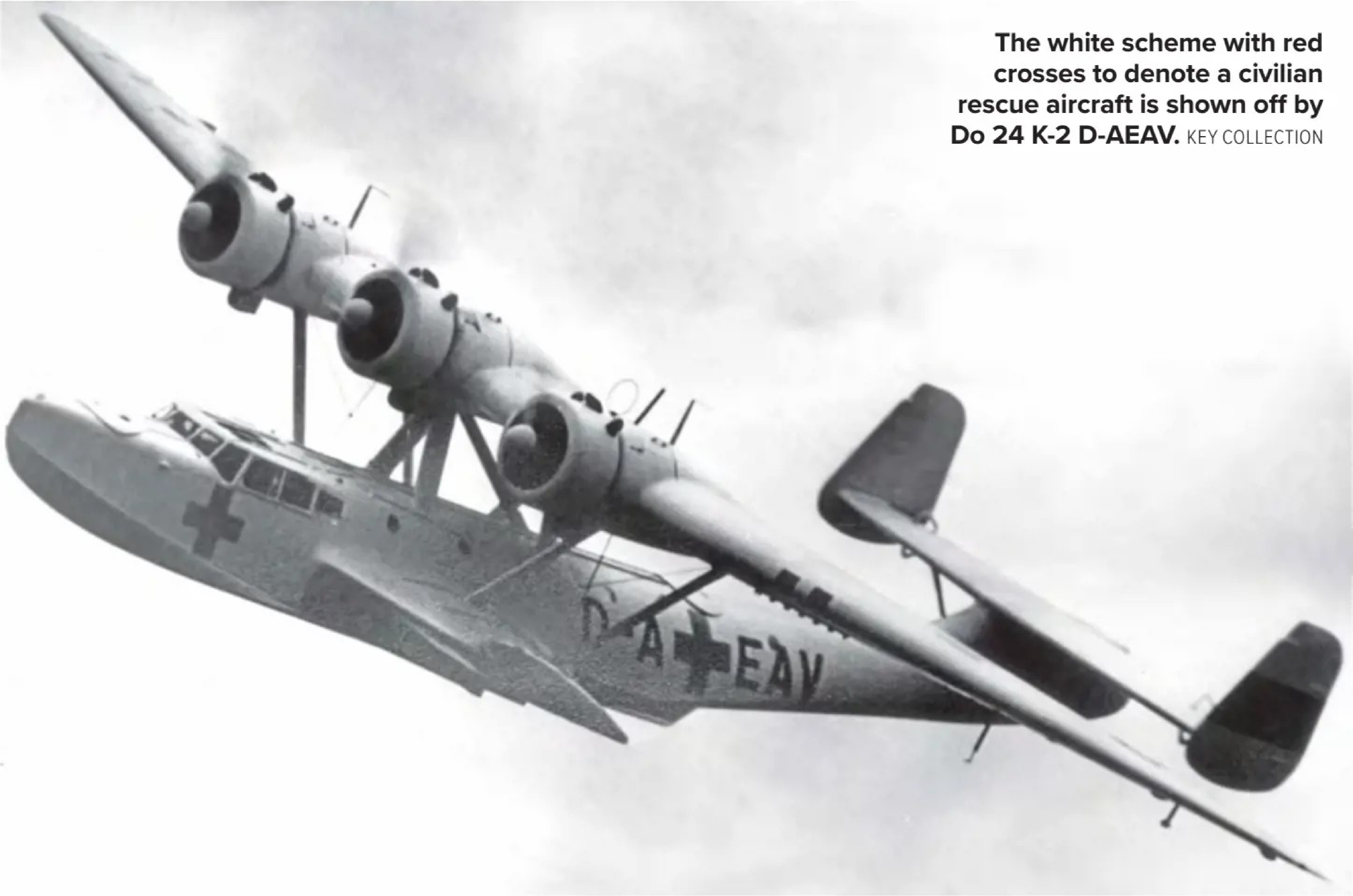
Overall, the majority of Dutch actions were defensive, as they were too thinly spread, under-resourced and outnumbered by the weight of the enemy's forces. The Dorniers were getting worn, damaged and running out of spares while their resourceful crews faced exhaustion — the last probably being a factor when X-19 attempted a landing in a flooded paddy field, as reflective as open water, on 25 January 1942. In the resulting crash, all the crew were killed.

Germany

The surprising difficulties the German military faced in the April 1940 Norwegian invasion, Operation 'Weserübung', necessitated a number of extemporary efforts. Resistance from the Norwegians, supported by the British at Narvik beyond the polar circle, meant the only way the isolated German forces could be resupplied was by air, via the sea.

On 12 April the Do 24 V1 and three Bv 138s were selected to provide an ammunition resupply to Narvik under the command of Flugzeugführer A. Mlodoch. For this the aircraft were allocated to Kampfgruppe zum besondere Verwendung 108 — See (KGrzbV 108 See), an ad hoc unit created for this role. The Dornier was being used to test the prototype of the Rheinmetall-Borsig MG 204 in the amidships turret, and two more MG 15s were added for defence fore and aft. Tellingly, given the RLM's preference for the Bv 138, only the Do 24 was able to take off from the glassy water.

A Norderney-based Do 24 T, coded KO+AD, undertakes a rescue. FRANZ SELINGER



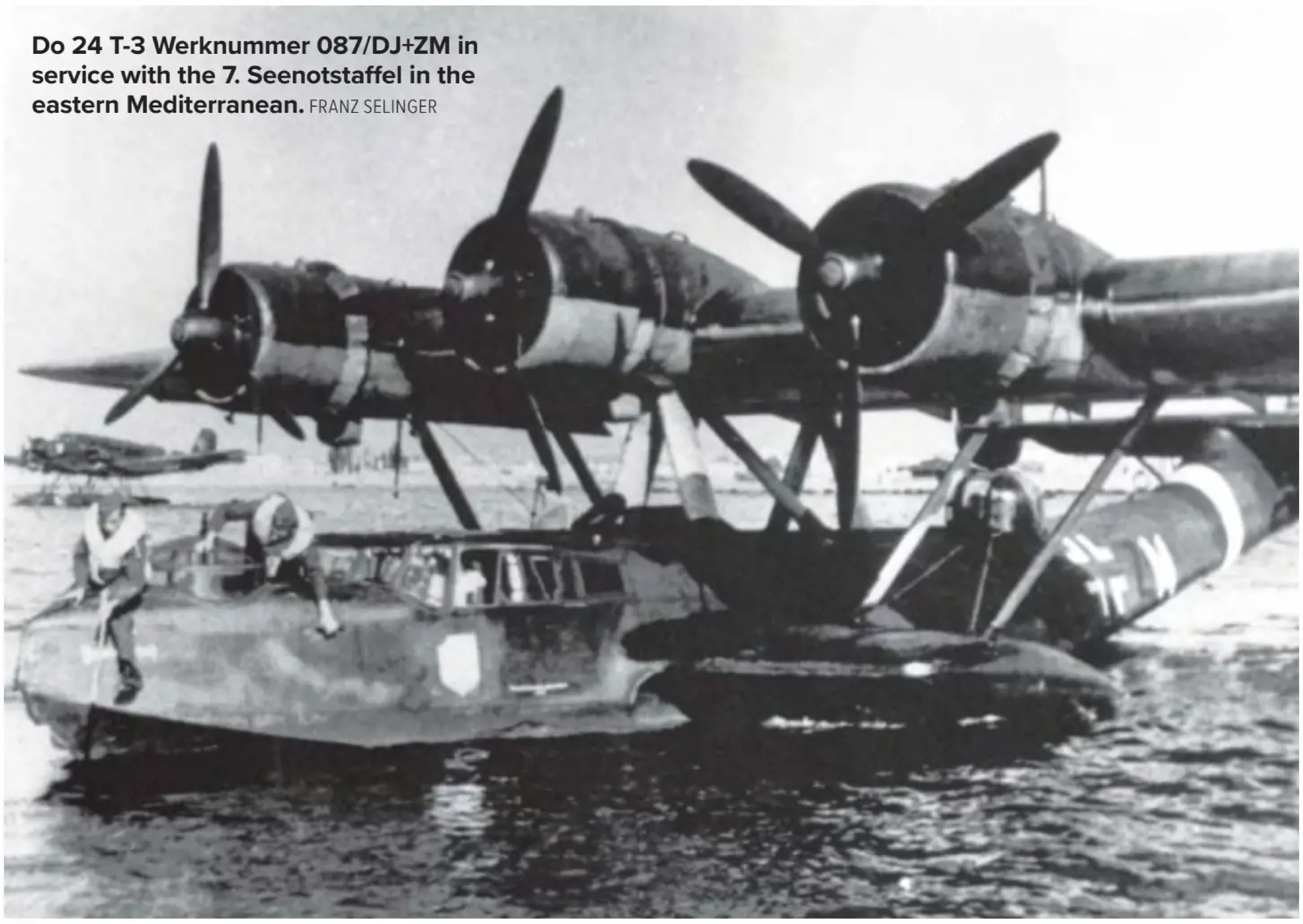
The white scheme with red crosses to denote a civilian rescue aircraft is shown off by Do 24 K-2 D-AEAV. KEY COLLECTION

DATAFILE

RETTUNGSKOLLAPS

It was found that some of those rescued by the Seenotdienst died mysteriously 20 to 90 minutes after pick-up. This became known as Rettungskollaps, or rescue collapse. While the cases were — and are still — not fully understood, it was accidentally discovered that recoveries where the airman was brought from the water in a horizontal position increased the chances of survival. The way the Seenotdienst Do 24s were configured accidentally benefited a greater survival rate, simply because weakened survivors were brought in over the sponson and hatch to the bunks, mostly horizontally, rather than up a ladder as on the He 59.

These front-line discoveries were compromised by the repugnant Nazi regime's immoral range of experiments on human prisoners in Dachau concentration camp, which unethically further tested the horizontal recovery versus the vertical method, and more including open-water hypothermia and forced seawater drinking to gather rescue data.



Do 24 T-3 Werknummer 087/DJ+ZM in service with the 7. Seenotstaffel in the eastern Mediterranean. FRANZ SELINGER

DATAFILE

SPECIAL MISSIONS

The Dorniers were also used as transports, notably for keeping contact with troops left behind on the Aegean islands and Crete, and for supporting the Kuban bridgehead in early 1943. The special unit Kampfgeschwader (KG) 200 was tasked with a mission dubbed 'Aktion 24' to fly four Do 24s to the Vistula river and to blow themselves up when underneath bridges at Toruń, Warsaw, Dęblin and Kraków, to slow the Soviet advance. Despite the aircraft being prepared and crews selected, it never went ahead.

Despite bad weather, and with only a school atlas map to navigate by, the Dornier coasted along the Norwegian shore and fjords, stopping once to establish position with advice from a shepherd, and dodging fire from various Royal Navy ships. When Mlodoch and his crew arrived in the wreck-infested Narvik harbour in the midst of a battle, they were only able to moor up quickly and get ashore, leaving the supplies aboard. A British motorboat attempt to tow the flying boat away was frustrated by a burst of machine gun fire from the Germans ashore.

Somehow the aircraft was not seriously damaged, and the crew flew out on the early morning of 16 April. On board with them were two wounded naval officers and a British prisoner of war believed, incorrectly, to be a cousin of Winston Churchill. Stopping in Denmark to get diesel fuel from a German tank unit, they returned to Travemünde.

After that, both prototypes were used for missions to and from Norway, until the V1 was lost following a forced beaching near Vardø. The other prototype was scrapped after the Norwegian campaign due to accumulated damage.

The origins of the German Seenotdienst (Sea Emergency Service) lie with the first ever dedicated air-sea rescue unit, Seenotflugkommando (SNFlKdo) 1, based on the North Sea island of Norderney. It was established just before the outbreak of war in 1939, but traced its origins back to 1935 when aircraft were added to rescue facilities on the German coast.

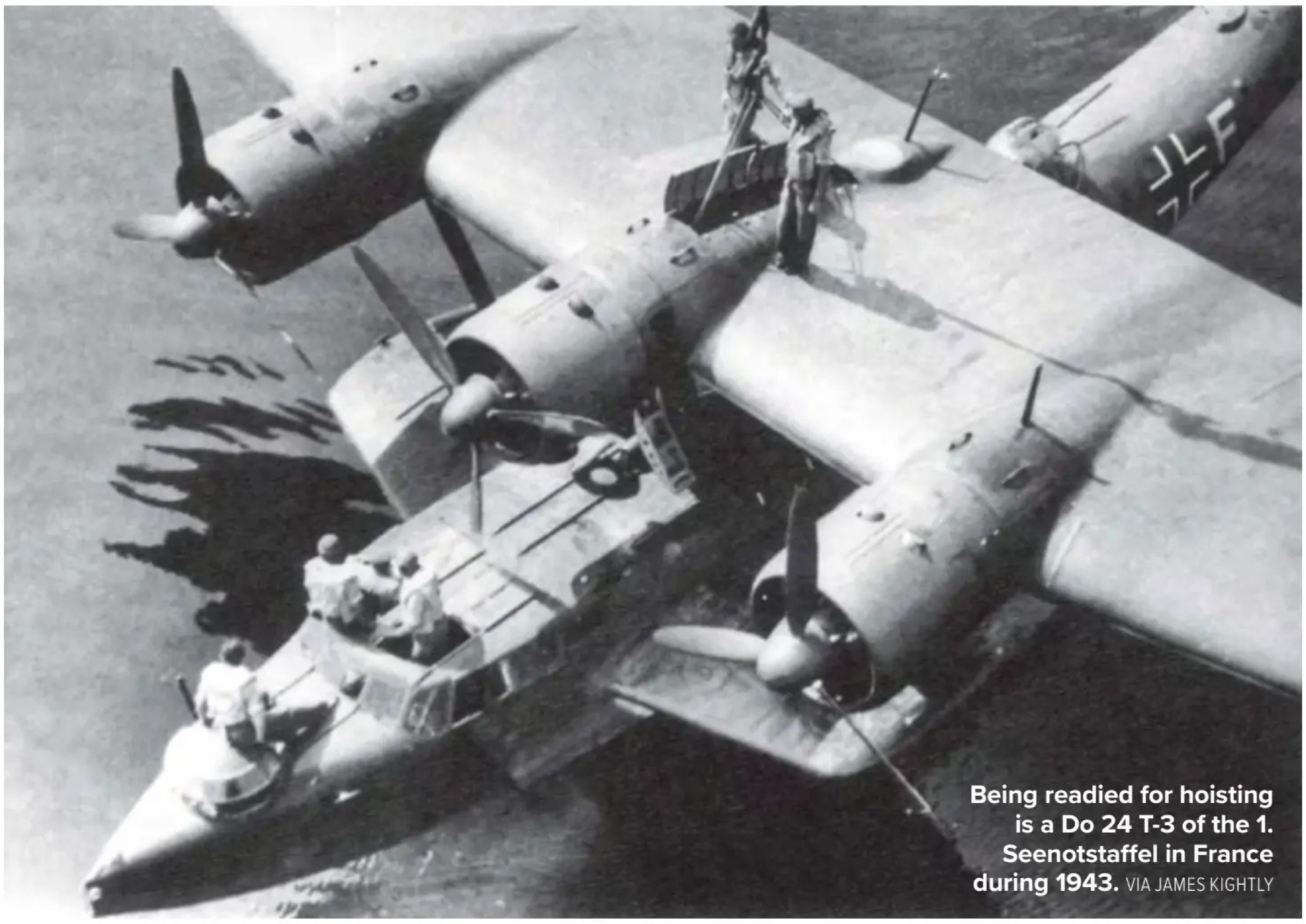
Germany's success at war hugely enlarged both the length of coast it possessed and marine areas of operation, and thus the requirement for rescue aircraft and units. Despite the evident obsolescence of the biplane Heinkel He 59, the addition of Dornier Do 18s did not significantly improve matters due to the limitations of the type's engine performance and cabin size. But the captured Dutch production line of Do 24s seemed tailor-made for the task, even though the rescue capability was never part of either Dutch or German 1930s specifications.

Two Do 24 K-2s were flown to Travemünde in July and August 1940, and on this occasion enthusiastically endorsed after extensive testing. The first, D-AFBT (confusingly, later D-AEAV), number 74 from the Aviolanda line, and the second, D-APDA, number 75, were painted white with red crosses and had their turrets removed. Flugkapitän Karl Born found the aircraft able to operate in a "carefree" manner in sea states up to 4, and it could be landed in sea state 6 (very rough, waves of 4-6m), whereas the He 59 was limited to sea state 3.

The Do 24 V2 in Norway, where it was assigned to KGrzbV 108 See. JAMES KIGHTLY COLLECTION

The dispersed and secondary status of the Seenotdienst units caused a multiplicity of unit designations, as demand for rescue coverage waxed and waned. Furthermore, in the latter part of the war, units combined or collapsed, and paperwork fell behind the reality of any order of battle. In summary, the main units were Seenotstaffeln 1-10, taking in the Baltic, North Sea, Scandinavia and the Arctic, the Channel, Atlantic, Mediterranean and Black Sea.

D-APDA was soon lost while trying to recover a Heinkel He 111 crew and their



Being readied for hoisting is a Do 24 T-3 of the 1. Seenotstaffel in France during 1943. VIA JAMES KIGHTLY

attempted rescuers in a He 59 from a minefield on 18 August 1940. Flugkapitän Born made a rough-sea landing, but hit a second wave so hard all three engines were torn off, the falling centre engine missing him by centimetres. His crew and six other survivors were eventually picked up by patrol boat, once the still-floating Dornier drifted clear of the mines.

Following RAF attacks on the unarmed, red-crossed and white-painted Seenotdienst aircraft — Britain claimed they were also being used for reconnaissance, negating their non-combatant status — in July 1940 the ostensibly civil operation had the aircraft rearmed and re-camouflaged, and they lost the government registrations at the same time. In November 1940 the designation of Seenotflugkommando was changed to Seenotstaffeln as another step in this militarisation. Nevertheless, the Do 24 began to establish the role in which it was to become famous and a literal lifesaver for thousands. The 10 Seenotstaffeln were deployed by 1942, primarily equipped with the Do 24, but also a grab-bag of other aircraft such as the Breguet 521 Bizerte.

Rescues were undertaken by the France-based Seenotstaffel 1 deep into the Atlantic, and even close to the UK in the case of a downed Luftwaffe fighter pilot at night off the Scilly Isles. A Focke-Wulf Fw 200 C-3 crew was rescued by the Do 24 T-1 coded KK+US 400 miles north-north-west of Cape Finisterre on 13 February 1942. Concerned they could not get back to France, the crew touched down by the neutral Spanish coast and were refuelled with Spanish help, despite British embassy protests.

> ***“Flugkapitän Karl Born found the aircraft able to operate in a ‘carefree’ manner in sea states up to 4”***

The seaworthiness of the Dornier meant the aircraft was used in conditions that resulted in structural failure, yet it could still do the job, as when Do 24 CM+IM landed in a heavy swell to rescue a Heinkel He 115 crew off Cape Nordkinn in May 1942. The rear fuselage sheared and the empennage broke off, but thanks to the normal alighting procedure, the rear gunner had come to the main compartment and secured the aft bulkhead door, meaning the aircraft was still watertight. It was thus able to taxi as a boat into Kjøllefjord the next day.

A notable rescue adventure in the Mediterranean was on 15 June 1942. Do 24 T-2 Werknummer 123/0051 of Seenotstaffel 7, flown by Feldwebel Sost, was shot up by escorting aircraft while passing an Allied convoy. They were able to continue and located Messerschmitt Bf 109 pilot Leutnant Heinrich Hesse of 7/JG 53 who had been in his dinghy for 24 hours. The take-off in rough seas went wrong, and the tail and half the port wing broke away, but the aircraft remained buoyant. Roped to the other crew, mechanic Robert Moller slid down the wing to reposition the radio antenna wire to radio for help. It arrived via a He 111, which directed U-boat U-83 to pick them up and sink the Do 24 wreck afterwards.

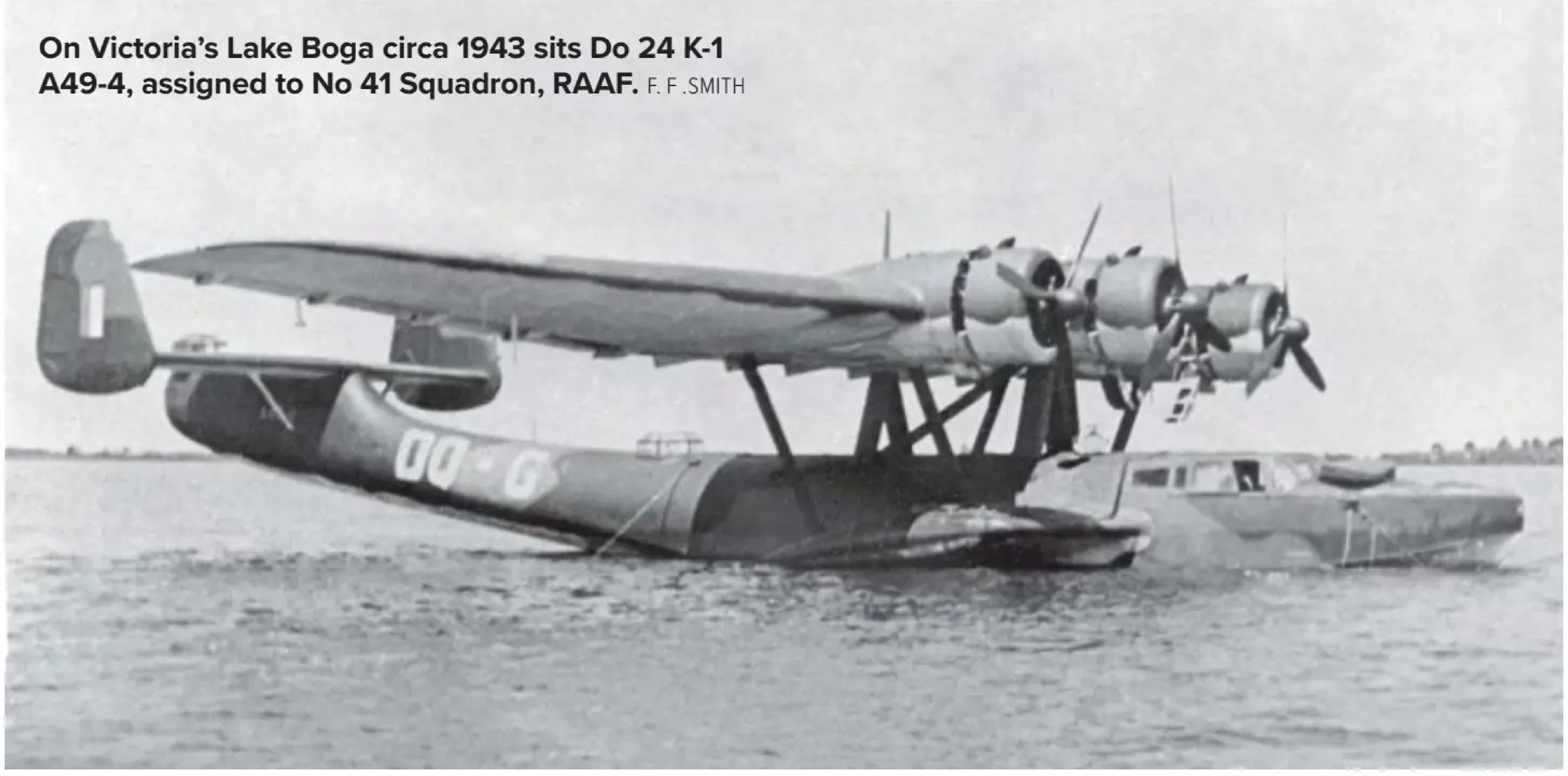
Under the German retreats from 1943 onwards, Do 24 units spent more time undertaking evacuations — with significant losses from enemy attacks — rather than the air-sea rescues they had been created for. The last aircraft to leave Odessa in the face of advancing Soviet forces was a Do 24 T with 40 troops crammed in, and just two operative engines. On 26 November 1944, Staffelkapitän Oberleutnant Holtkamp and crew rescued the entire crew of a shot-up and grounded German patrol boat. The skilled pilot managed to use a 1,600ft channel and flew the survivors out on three sorties, despite crosswinds, at night. A night fighter attack was experienced on the final take-off.

Karl Born, commander of Seenotgruppe 81/Ostsee, sent his Dorniers to evacuate Berlin’s refugee children from their KLV-Lager camps where they had been hiding from Allied bombing, but were now under threat from the Soviet advance. The unit made an incredible lift from the seaplane stations at Nest (now Uniescie, Poland) and Kamp. Each aircraft carried 70 children at a time, with Soviet tanks in sight. Not surprisingly, it could go wrong: on 5 March 1945, an overloaded Do 24 stalled on take-off and crashed. Of the 72 evacuees and crew, only one was able to be rescued by another Dornier crew. One successful record uplift comprised 17 adults and 99 children.

The German surrender was not the end for Seenotstaffel 81 in liberated Denmark. Born proposed to use his unit to fly wounded Germans from Danish hospitals back to Germany. With cautious British permission, the unit’s 15 Do 24s were disarmed, the swastikas painted over and red crosses on white circles reapplied. On 18 June they and an Arado Ar 196 flew to Schleswig, with a Danish soldier aboard each Dornier. They had an escort of 16 Hawker Typhoons from Nos 75 and 184 Squadrons, RAF. The German Do 24s finished their war as they had started, as extemporary lifesavers.

Australia

Six Dorniers — serials X-5, X-7, X-8, X-9, X-10 and X-24 — that escaped to Australia went to RAAF Rathmines, New



On Victoria's Lake Boga circa 1943 sits Do 24 K-1 A49-4, assigned to No 41 Squadron, RAAF. F. F .SMITH

South Wales, in March 1942 to continue MLD crew training, but the school moved to Jackson, Mississippi, and the aircraft were effectively orphaned.

In mid-April 1942, these aircraft (excepting X-24) went to the Royal Australian Air Force. The initial intention was to use them for communications and air-sea rescue work. The Dorniers were flown to Lake Boga in remote rural inland Victoria, set up as a 'secret flying boat base' to be safe from the Japanese threat. There, lacking beaching facilities, they were dragged into dug-out trenches in the lakeside to undergo servicing.

It was soon found that the Dorniers were all very tired airframes, and unfortunately the sub-type of the engines was one for which spare parts supply was difficult. The most serious ongoing issue was that the airframes had become so strained the sponson tanks leaked fuel into the cabins in the hull. Patched up, they were allocated A48- serials. They were downgraded to be overhauled and used for unarmed transport work with No 41 Squadron, RAAF.

When serviceable, the Dorniers operated mainly from Townsville to areas such as Goodenough Island, Milne Bay, Darwin and the southern ports. A49-1 and A49-3 were detached to Kiriwina on the Trobriand Islands and assigned to No 8 Communication Unit for air-sea rescue assignments between Milne Bay and New Britain.

Eventually, No 41 Squadron was re-equipped with Martin Mariner flying boats. The Dorniers were dragged ashore, the engines removed, and scrapped at Lake Boga.

France

After the liberation of Paris, the French production line was restarted, the Do 24 Ts going to the Aéronautique Navale's newly formed Flottille 9F Tr. Established in December 1944, it received the first two aircraft in December 1944. Twenty more were completed during 1945. Some had the centre turret position replaced with an ad hoc British-sourced air-to-surface radar operator's station.

In January 1946 the unit was renamed Escadrille 30S and reallocated from a transport to an air-sea rescue role, with a second unit, Escadrille 20S formed in March 1946 and based in Corsica. A third unit, increasing coverage further, was Flottille 9F (Exploration) at Karouba, Tunisia, converting both from the designation Escadrille 4S and from the Supermarine Walrus in January 1946.

The final Do 24 T was launched by the French factory in July 1947. After a few years' use, the remaining serviceable Dorniers were delivered to the flying boat school at Karouba, Escadrille 53S. The last was withdrawn in 1953 and scrapped the following year.

> *"The Australian Dorniers were all very tired airframes"*

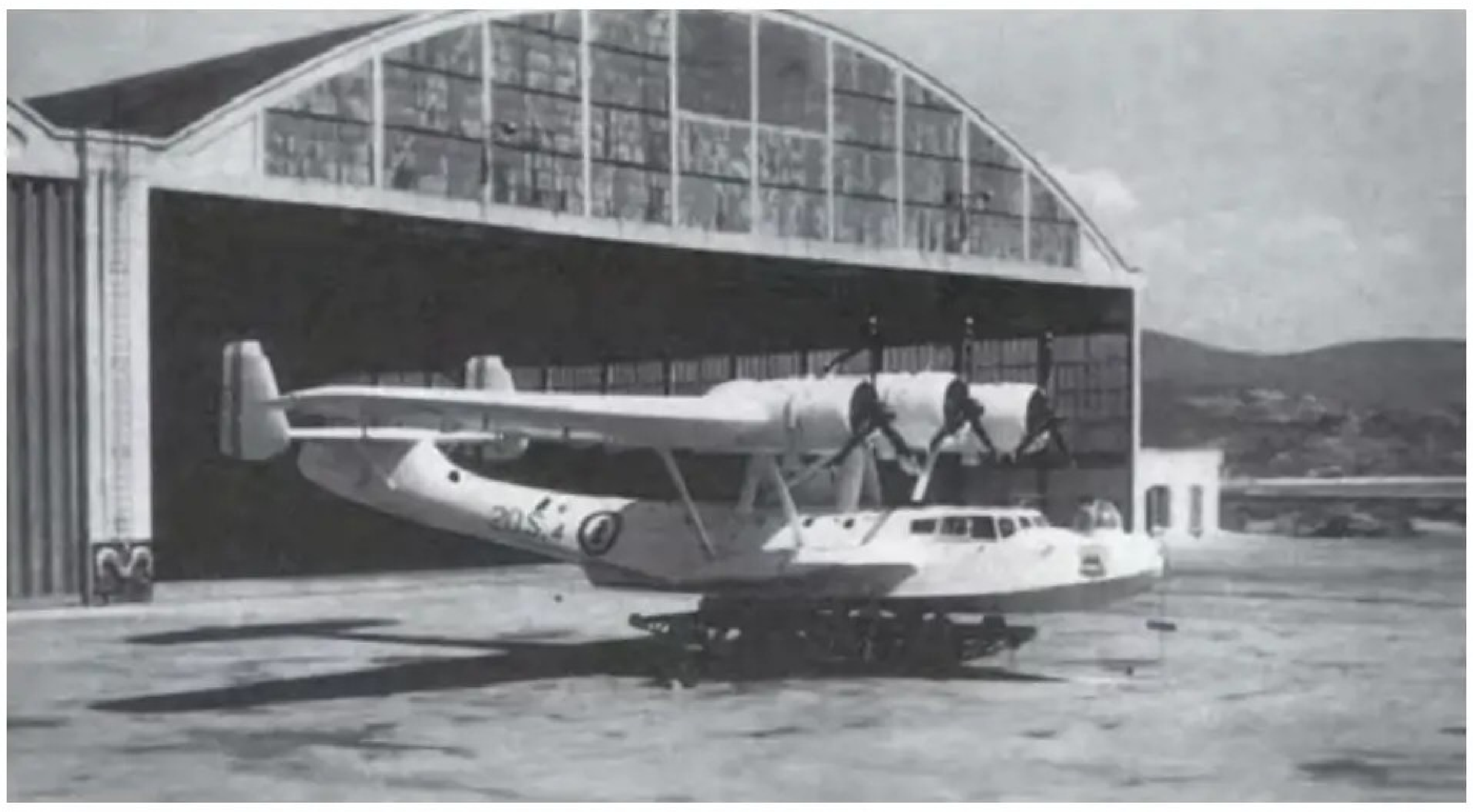
Spain

The Do 24's capabilities in air-sea rescue led to an unusual international project where the neutral — but fascist — Spain acquired 12 Do 24 T-3s in June 1944 to provide rescue coverage in the Mediterranean for the combatant nations. The transfer was a way to replace rescue aircraft provision in the north-west Mediterranean after Allied advances captured the Luftwaffe's Seenotdienst bases, as well as making up for the increasing inability of the Germans to evade Allied attack in their rescue aircraft.

Locally designated HR.5 and HD.5 at different times by the Ejército del Aire, the Dorniers were supplied from new Fokker-built Do 24 T-3 stocks. The Spanish crews were trained at the Étang de Berre near Marseilles by Seenotstaffel 3 before flying their aircraft to their new home. The initial rescue was attempted "within hours" of the first machine's arrival at the harbour in Pollença, Mallorca, on 30 May 1944. While this search for a Luftwaffe aircraft downed near Port-Vendres did not result in a rescue, the crews of two RAF Beaufighters correctly recognised the Do 24 as a neutral Red Cross aircraft and held back from opening fire on it. This was a new Fokker-assembled machine, flown by the unit commander Comandante Carlos Pombo.

The Spanish machines were initially in overall Luftwaffe-style green/grey camouflage, with red crosses adjacent to the Spanish roundels. The rudders went on to be painted yellow, while yellow bands (subsequently white) were applied on the wings and fuselage, and the green changed to a 'bottle green' in 1954. This colour combination, together with their role, led to the nickname 'Guardias Civiles' (Civil Guards) after the similarity to the green uniforms and yellow belts of the Spanish militarised police force. They were also given religious names, after the Virgin Mary.

The airmen of Regimiento Mixto Núm 3, later a Grupo of Regimiento Núm 51, undertook a significant number of rescues of both sides' combatants and a few civilians as well. They took place in an active war zone, often with inadequate information, in all weathers. This was despite declining numbers of serviceable aircraft, which



Stationed at Aspretto, Corsica, Escadrille 20S of France's Aéronautique Navale was a Do 24 user from 1946-50.

Last of the Spanish Do 24 T-3s to fly in its original form was HR.5-4, delivered back to Dornier in August 1971. This aircraft's fuselage was used to create the Do 24 ATT. KEY COLLECTION

HR.5-4 on the Bodensee in August 1971. It is not known why the serial was changed from HD.5-4, which was its last Spanish Air Force identity. ADRIAN M. BALCH COLLECTION

caused Regimiento Núm 51's disbandment.

In 1953, seven Grumman SA-16A Albatross amphibians were acquired to supplement the pure-flying boat Dorniers in the new Servicio de Búsqueda y Salvamento — SAR (Search and Rescue Service) as part of American military aid to Franco's Spain. The Grummans operated from Son San Juan, Palma, in co-operation with Sikorsky H-19 helicopters. The Grumman amphibian's rough-water open-sea capabilities were simply not as good as the Dornier's, one Albatross losing wing floats and turning turtle in shallow water and conditions in which a Dornier would not have been at risk. However, the Grummans were better-equipped, not least with sea search radar.

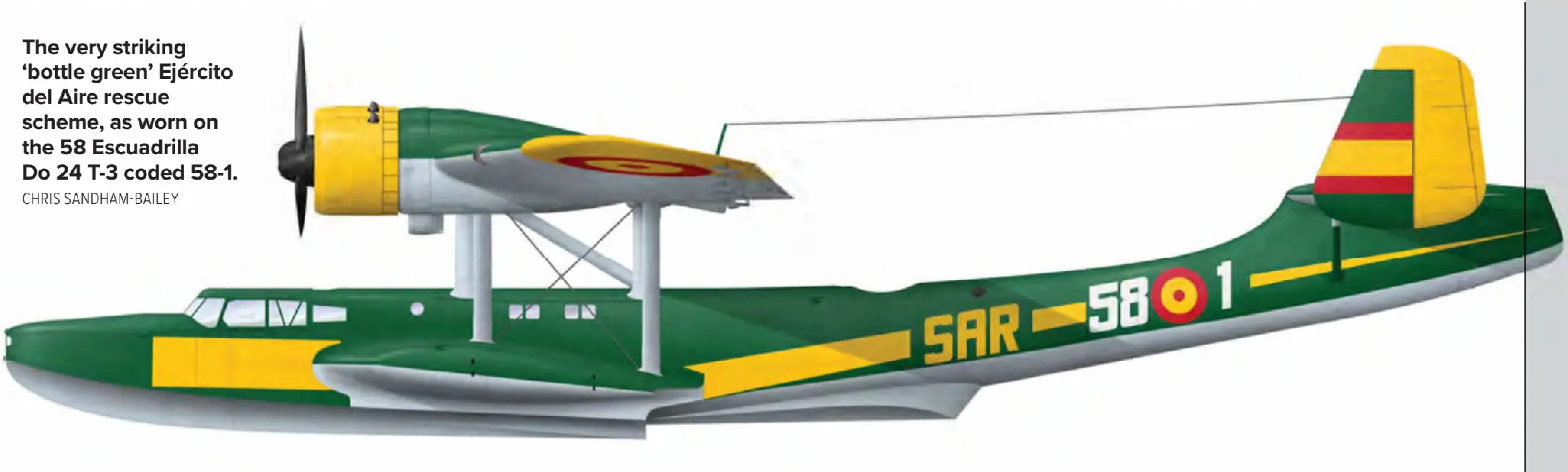
In 1958 reconditioned Do 24 Ts, equipped with more modern radio and navigation equipment, were returned to service in the Mediterranean. They were assigned to 58 Escuadrilla at Pollensa, redesignated 804 Escuadrilla in 1965. They remained on the Ejército del Aire inventory until final decommissioning in 1969.

Sweden, USSR, Norway and Britain

- On 31 October 1944, a Seenotstaffel 9 Do 24 T-2 (CM+RY, Werknummer 3343) was stolen from Nest by two deserters. They fled to neutral Sweden, where the aircraft was impounded. Acquired for 250,000 Krona, it was used by the Flygvapnet for air-sea rescue, with the local designation Tp 24 and coded F2-90. Due to the lack of spares and the arrival of Consolidated Catalinas for Sweden, it was scrapped in 1951.
- Do 24 5W+BU of Seenotstaffel 50 from Oslo, Norway, landed at Trelleborg, Sweden in 1945, after becoming lost. It was flown by Unteroffizier Paul Blum with 37 escapees over the night of 8-9 May. The four-man crew, passengers and aircraft were handed over to the Soviets, among thousands who had fled the Baltic states. A single Do 24 — probably this example — was still in use in 1947 with Polarnaya Aviatsiya (Polar Aviation).

The sole Tp 24 to see service with Sweden's Flygvapnet, specifically with F 2 wing. FLYGVAPENMUSEUM

- Norway acquired two Do 24 T-3s, Werknummer 3300 and 3335, on the German surrender in 1945. With German crews, they were briefly used for air-sea rescue as part of 333 Squadron, Royal Norwegian Air Force based at Oslo-Fornebu, but due to damage and lack of spares, both were scuttled off Horten during February 1946.
- At the war's end, three Do 24s in the Schlei inlet at Schleswig were brought to the UK for evaluation. The first (Werknummer unknown, AM115/VM483) was flown to Felixstowe, but sank in a gale during early October 1945. The other two (Werknummer 1135, AM114/VN865, and Werknummer 3435, AM116/VN870) conducted type trials and tests of air-sea rescue equipment. Both were scrapped in late 1947. Other Do 24 Ts in RAF markings were flown by German crews on radio navigation beacon calibration duties in post-war Germany for some months until early 1946. Their exact details are currently unknown.



The very striking 'bottle green' Ejército del Aire rescue scheme, as worn on the 58 Escuadrilla Do 24 T-3 coded 58-1. CHRIS SANDHAM-BAILEY

Superb water-borne characteristics were key to the Do 24's longevity and success

A dramatic-looking nose-high alighting by Do 24 K-2 X-1 on the Bodensee during 1937. NEDERLANDS INSTITUUT VOOR MILITAIRE HISTORIE

The Do 24's airframe was 'right' from the start and never saw any significant design change, which reflects well on the processes Dornier used in creating its penultimate production flying boat. Perhaps the most important facet of its capability is the record of more than 12,000 people rescued by Dornier flying boats, 11,500 of them by German units. This was thanks to exceptional open-water and rough-sea capability. The refined design, with a high-metacentre hull configuration, combined with the sponsons' advantages, enabled the Do 24 to roll and recover more easily. The sponsons also assisted in getting up onto the step, unlike wing floats which were of no help in planing and vulnerable to rogue waves. The high wing kept the three engines clear of the water and enabled excellent turning capability on the water, combined with the high, multi-rudder empennage.

The main weakness of the Do 24 was that rough-water operation would cumulate in straining the structure of the sponsons, causing the fuel tanks inside them to leak — often into

All who flew the Do 24 ATT, here being demonstrated at Biscarrosse in 2008, marvelled at its qualities on the water. DAVID HALFORD the fuselage. The extensive use of electrical systems was a problem due to salt-water corrosion, resulting in electrical failures. The combination of fuel leaks and troublesome electrics was a significant concern for crews. Several Do 24s were lost in circumstances where this was the most probable cause.

During 2008, the late Dieter Thomas, ex-Dornier chief test pilot, gave this magazine's now editor an insight into the Do 24 ATT's performance with the original hull and new wing and turboprop engines: "The first wave that hits you after reaching 50kt, including the wind, catapults you into the air like a Harrier going off a ski-jump. It rotates you, and then you hang in ground effect and accelerate, hoping that you don't fall back. But you never fall back, because the wing is fantastic."

> ***"Iren Dornier said, 'This aircraft is definitely unbeatable in the water'"***

Speaking to Ben Dunnell in 2004, Iren Dornier said, "It's unique to fly as it has a combination of very modern flight controls and the original mechanical controls for the rudder and elevators… This aircraft is definitely unbeatable in the water — absolutely exceptional, in fact. I've never, ever seen another aircraft perform in this way. In the water, she can sustain high waves, up to sea state 4 [about 2m].

"We have to trim her carefully — then, it's not a problem to get out of the water. It will probably take you 260m maximum. When landing, of course, you have to be careful because you can damage a seaplane very easily if you misjudge the height. Our approach speed is about 80kt, going all the way down to the touchdown speed of about 55kt. That's also the take-off speed. At 55kt, I'm already getting her into ground effect."

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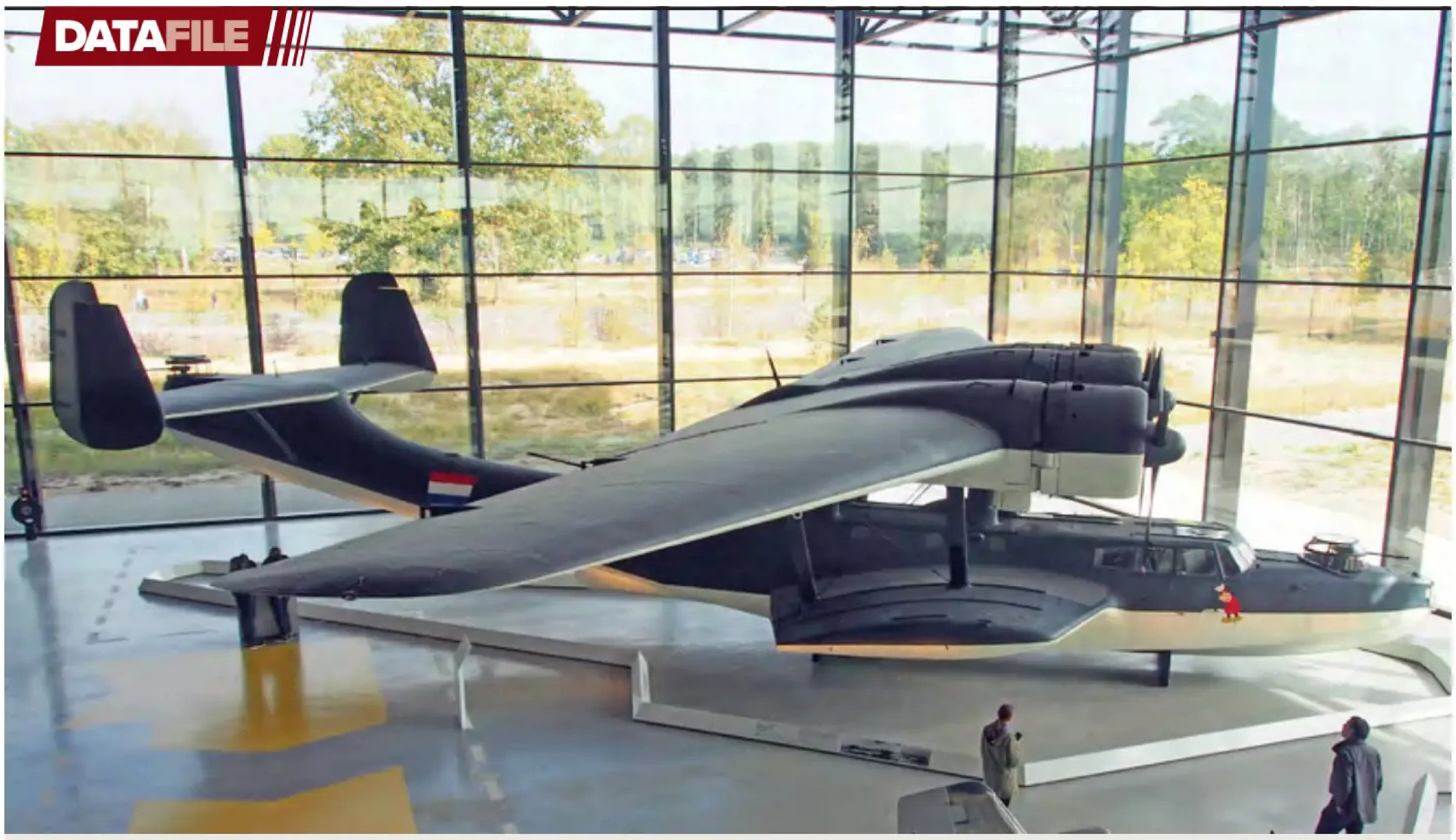

The sole representation of a wartime Dutch Do 24 is provided by HD.5-1/Werknummer 3387 in the Nationaal Militair Museum at Soesterberg. ALF VAN BEEM

Do 24 SURVIVORS

At the time of the Do 24's retirement by the Spanish Air Force, no other examples were known. One, serial HR.5-4, was flown to the Dornier Research Centre at Immenstaad in August 1971. A couple of the stored aircraft were acquired by American collector Dolph D. Overton in 1977. He donated two to the RAF Museum: HD.5-1 was accepted and taken to the UK, while HD.5-3 went to Germany. However, the '5xxx'-series identities often previously quoted for these airframes are now believed to be fuselage part numbers only.

In Germany, Do 24 T-3 HD.5-3 is on display at the Flugwerft Schleißheim branch of the Deutsches Museum. The fuselage is Aviolanda-built Werknummer 5291, with the original wing of the Do 24 that became the Do 24 ATT. Now at the Dornier Museum in Friedrichshafen, the ATT itself was Werknummer 3385 (fuselage 5345), today registered D-CIDO.

Formerly exhibited at Hendon, the RAF Museum's ex-Spanish Do 24 T-3, HD.5-1/Werknummer 3387, was loaned to the Dutch Military Aviation Museum in November 1991. The 'Do-nuts' volunteer team restored it to represent the historic X-24 *de Ouwe Lobbes*. Since gifted permanently, it is displayed in the combined Nationaal Militair Museum at Soesterberg, the only complete Do 24 in World War Two configuration.

At the Museo del Aire in Cuatro Vientos, Madrid is Do 24 T-3 HD.5-2/Werknummer 3406 (hull 5341), coded 58-2. Delivered from the coast by truck, it arrived in 1970 and was displayed 'floating' in an artificial lake. It underwent refurbishment in 2011.

An unidentified ex-Dutch nose, once used as a houseboat on the River Murray, survives at the Lake Boga Flying Boat Museum in Victoria, Australia. Another anonymous fuselage is on display at the Technik Museum Speyer after being recovered from the Müritzsee in Mecklenburg-Vorpommern, eastern Germany. The forward fuselage which can be found exhibited in the Musée de l'Hydraviation at Biscarrosse, France is from a Do 24 T-3, Werknummer 1101. It was recovered alongside 1107, which was later scrapped.

Two Dutch Do 24 K wrecks, X-23 and X-1 (the first Do 24 to fly), remain in situ in Broome's Roebuck Bay and can be visited at low tide. Other wrecks include relatively complete examples off Cavalaire-sur-Mer and Toulon, France. In Norway, ex-Seenotstaffel 51 Do 24 T-3 Werknummer 1132 is 20m underwater off Kirkenes, while another wreck lies near Kjevik airport, its identity unknown. A so far anonymous example was discovered in 2022 near Avola, Sicily.

The ex-River Murray houseboat Do 24 nose before going on display at Lake Boga, Victoria.
MARTIN EDWARDS VIA JAMES KIGHTLY

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This reissued publication (2019) exemplifies the huge range of disparate aircraft types and roles in play throughout the D-Day period.

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The publication also offers seldom-covered subjects such as the Canadian 415 Squadron and its Fairey Albacores, which guarded against Kriegsmarine E-boats in the Channel.

And while much of the coverage concerns Allied air assets, it also casts light on the fortunes of two Luftwaffe units during June 6, 1944, and the following period.

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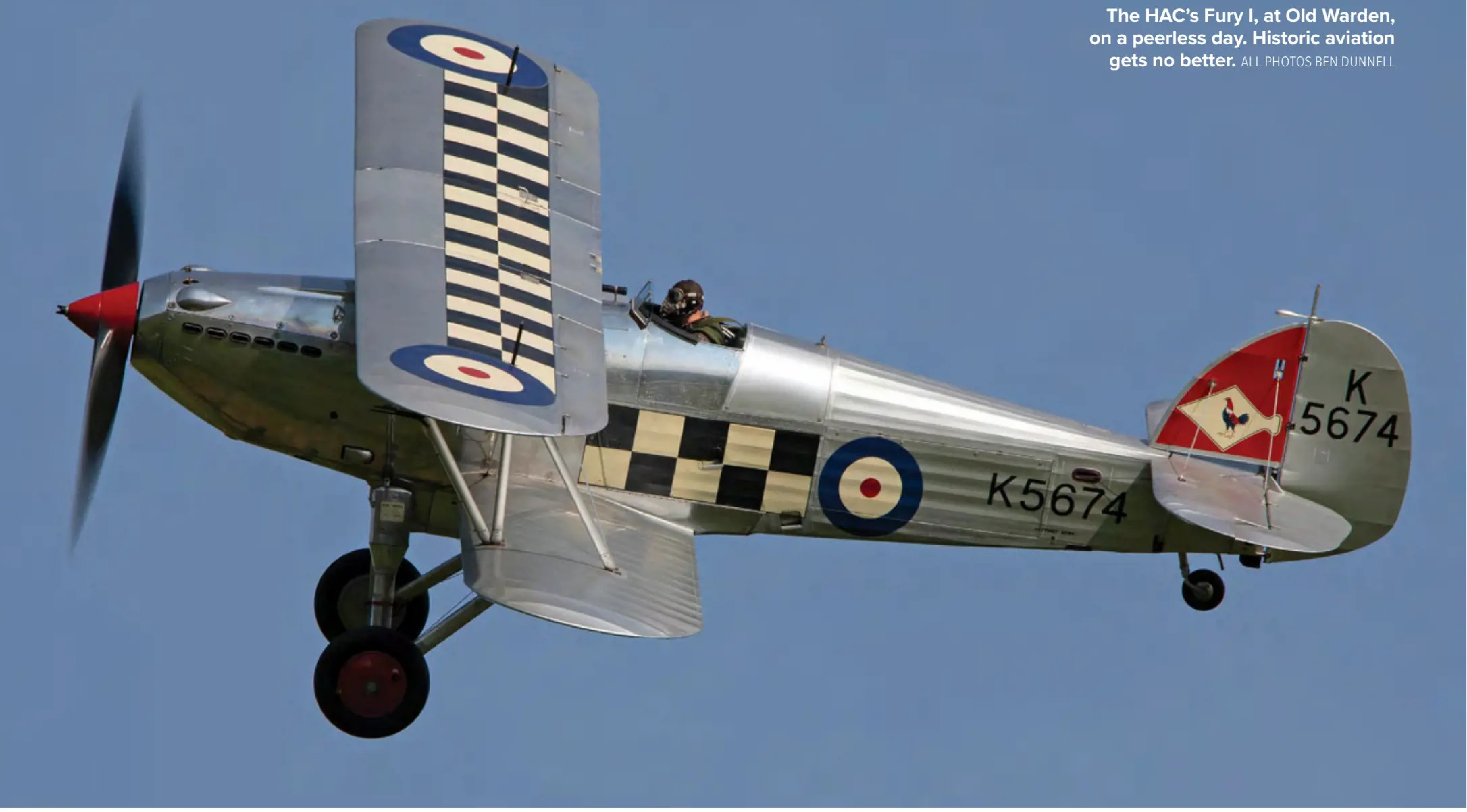

The HAC's Fury I, at Old Warden, on a peerless day. Historic aviation gets no better. ALL PHOTOS BEN DUNNELL

Shuttleworth Best of British Air Show

12 MAY

Well, that was a long wait in more ways than one. After a seemingly endless winter, a relentlessly wet spring, and 12 years of expectation surrounding the Old Warden debut of the most exalted of all 1930s RAF fighters, the stars well and truly lined up for the Best of British Air Show.

Since its maiden post-restoration flight during July 2012, the world's only Hawker Fury I, K5674, has made few forays from its Duxford base. Top of everyone's list as *the* perfect location for a Fury display has, naturally, been Old Warden, and the new Shuttleworth airshow organiser, the still 30-something James Butt, was determined to get it over as soon as possible, what with the machine currently being offered for sale by its owners, the Historic Aircraft Collection. During the late morning, as the airfield car parks started to reach occupancy levels not seen since before the pandemic, a deep hush descended as Clive Denney brought the exquisite biplane in to land, the barrage of camera shutter chatter only abating well after Clive had shut down the Rolls-Royce Kestrel in front of the spectator fence.

The show opened with an example of the Fury's successor, the Hurricane, MkIIc LF363 from the Battle of Britain Memorial Flight making three passes in the hands of Sqn Ldr Mark Sugden. Next up was a de Havilland formation the like of which has not been seen for decades, with a rare appearance from Andrew Wood's DH80A Puss Moth G-AEOA, Shuttleworth pilot Scott Butler at the controls, alongside Peter Kosogorin in Richard Shuttleworth's old DH60X Moth G-EBWD, with John Hurrell leading the way in the collection's DH51 and Richard Crockett cavorting over the top with the Chipmunk. Keeping it de Havilland, 'Dodge' Bailey flew his customarily stirring routine in the jewel in Shuttleworth's crown, DH88 Comet G-ACSS.

Another 'family' sequence brought solos from Shuttleworth's Percival Provost T1 — originally delivered to the RAF during March 1953 — and the Newcastle Jet Provost Group's 1961-built Jet Provost T3A, XM479, with Mark Hooton at the helm. Graham Saw demonstrated the UK's sole flying Slingsby Petrel, the prototype of just three built, and Paul Shakespeare took up another type which fell just one short of production number four, the world's only Parnall Elf, G-AAIN, a machine pre-dating the Petrel by 10 years. Saw's other glider outing was aboard the Elliotts of Newbury Primary, Richard Crockett powering around in the Comper Swift while it was towed aloft. A pair of Miles Magisters, V1075 and P6382, flown respectively by Frank Chapman and Andrew Monk — giving his first Shuttleworth display — had Hawk Speed Six G-ADGP in the

Alex Henshaw saluted by Spitfire V and Mew Gull.

The Mercury trio — Blenheim, Gladiator and Lysander — runs in.

Nick Smith's routine in the Fighter Aviation Engineering Spitfire XIV was a masterclass.

DH51, DH60X and DH80A in the de Havilland combine.

Air just got under the Sopwith Dove's wheels.

lead with collection chief pilot Paul Stone up.

The familial theme then turned to powerplants. The Bristol Pegasus-powered Swordfish I W5856 from Navy Wings had Glenn Allison at the helm, followed by a Bristol Mercury trio, with John Romain in the Aircraft Restoration Company's Blenheim leading Shuttleworth chief engineer Jean-Michel Munn in the Gladiator and Mark Sharp in the Lysander. All three broke off for zestfully elegant solo displays, the likes of which you won't see in such close proximity anywhere else. Shuttleworth's Avro XIX Anson, flown by Jean-Michel Munn, has become a firm favourite with its dash of dayglo and wonderfully resonant, deep-throated Armstrong Siddeley Cheetahs.

The First World War contingent comprised Si Davies in Shuttleworth's SE5a, 'Dodge' Bailey with the Sopwith Pup, Scott Butler aboard the Sopwith Triplane and David Bremner having a scarf-billowingly fine time in his Bristol Scout. Stu Goldspink got part-way down the cross runway in the Sopwith Dove, another of Andrew Wood's aircraft, before a snag prevented us from seeing three of the company's designs in the same piece of sky.

But all eyes were soon on the ex-No 43 Squadron Fury. Displayed at the Empire Air Day at its Tangmere base in June 1937 by Fg Off Frederick Rosier — later to become ACM Sir Frederick Rosier GCB CBE DSO — the fighter's vivid red spinner, wheels and tail and chequerboard-bedecked upper wing and fuselage were further enhanced by the recently rediscovered sun glinting on the highly polished cowling and cockpit surround as Clive Denney showed this unique part of British history off to fine effect, a pulse-quickening sight unlikely to be matched by any other single aeroplane this season.

> ***"I can't recall as splendid a start to a season at Old Warden, with such lavish flying fare"***

An Alex Henshaw tribute saw John Hurrell in Shuttleworth's Spitfire V, AR501, heading Frank Chapman in Alex's legendary Cape record Percival Mew Gull G-AEXF. The proposed third element of the group, Hawker Tomtit K1786, which was Henshaw's wartime runabout while working as a Supermarine production test pilot at Castle Bromwich, couldn't be persuaded to fire up and join in. The day was rounded off by a storming routine from Royal Navy F-35 Lightning pilot Nick Smith — son of display legend Brian — in Fighter Aviation Engineering's Spitfire XIV MV293, sporting its recently reapplied 1947 Royal Indian Air Force markings.

I can't recall as splendid a start to a season at Old Warden, with such lavish, and visually nutritious, flying fare.

Tony Harmsworth

Meeting Aérien 'Le Temps des Hélices'

18-19
MAY

C-47, two Spitfires and P-47 formed La Ferté's D-Day salute.

There has been a gradual 'changing of the guard' at La Ferté-Alais in the past couple of years, the result of the deaths of long-time commentator Bernard Chabbert in December 2022, and then in June 2023 — just after last year's show — of Jean Salis. He had founded the Amicale Jean-Baptiste Salis to honour his late aviator father, and created a structure that has helped sustain the exceptional collection of historic aircraft at this famous aerodrome. His own occupation, as noted on his passport, was simply 'avionneur' (aircraft constructor).

As fellow warbird operator Stephen Grey wrote at the time, "This great gentleman gave his heart to aviation until it ticked no more". Others recalled his Air Transat Paris to New York two-way crossing of the Atlantic in 1981, with Pierre Dague, in a Dragon Rapide which is now being restored to flying status in Royal Navy colours. The summary of his many achievements, including the numerous films made on the airfield, was set against various passes flown by the Caudron GIII, one of the aircraft Salis helped bring back to life.

Before the elegy, in a change to the traditional start, 10 paramotors rose as one in a carefully choreographed line of rising and descending machines, their small engines creating a comforting, pulsing buzz, almost as if they were at the dawn of time, like a flock of pterodactyls making their stately progress in front of us. Though not individually credited, the pilots were all able to squeeze onto a long flatbed with their kit for a well-earned round of applause after landing.

It was a shame that most of the Morane-Saulnier aircraft that add such character to La Ferté were not being flown, though the replica Morane H did fly with the Bleriot XI-2 Pégoud, Robert Villanova and Christophe Bailly putting on surely the best demonstration ever seen by these two 'pioneers', opposition passes and all. Except for a memorable rehearsal on the Friday evening, the Memorial Flight's BE2f was unable to display during the weekend, and is thus still to make its public flying debut. But the sight of the Mauboussin M125 Corsaire, also in the hands of Robert Villanova, was most welcome. The charming 1938-vintage trainer and tourer is operated by the Mauboussin Aéro Collection, based in Troyes.

The principal theme was the 80th anniversary of D-Day. The two Spitfires, Christophe Jacquard's PRXIX with Eric Goujon at the controls and the more recently restored W Aircollection FXIVe flown by Brice Ohayon, were displayed in tight formation last year, but largely offered separate solos this time. Less familiar here was Fighter Aviation Engineering's P-47D Thunderbolt, piloted with verve by Baptiste Salis a couple of times each day. The three fighters were led by the Chalair C-47B for a couple of passes.

BELOW: It was a joy to see the ARC's Lysander at La Ferté, complete with 'SOE agent drop-off' by Citroën Traction Avant.

CLOCKWISE FROM TOP LEFT: Airshow backdrops get little more dramatic than the huge funnel cloud that appeared during Saturday's C-47 display; French and very rare, the Marboussin Corsaire is just the sort of machine La Ferté is all about; Bruno Ducreux displaying Sea Fury F-AYSF for the first time in France; and Blériot XI-2 and Morane-Saulnier H in opposition.

A big hit with the French crowd was the Aircraft Restoration Company's Lysander, which had crossed the Channel, flown by Jon Gowdy, to become the focus of an SOE insertion/extraction scenario. Other British aircraft to have made the trip included Plane Sailing's Catalina in the sure hands of Paul Warren Wilson. His display was accompanied by the Casques de Cuir F4U-5NL Corsair, put through its paces with considerable panache by Edmond Salis. Now being operated from Dijon by Aéro Restauration Service after a series of owners over the years is Sea Fury FB11 WJ298, flown by Bruno Ducreux, who is a baker as well, according to the commentator!

The usual French-owned P-40 was not available for the *Tora! Tora! Tora!* Pearl Harbor scenario, so The Fighter Collection's P-40F took its place. Patrice Marchasson put the Merlin-engined Warhawk through a dynamic routine, against the background of multiple explosions and AAA air bursts set off following the mass T-6 dive attack.

Much to be seen at the 2024 event were the TB-30 Epsilons retired by the Armée de l'Air a few years ago, and which are increasingly popular with private owners. One was part of the array of aeroplanes giving pre-show 'baptêmes de l'air', while two others accompanied a freshly repainted Albert-based Flamant in a post-war French-built trainer threesome.

This year's international modern fighter action came from a Swiss Air Force F/A-18C Hornet, in which Capt Marcel 'Frodo' Rust was starting his first display season. The Armee de l'Air was also able to show its skills with a Rafale C, handled by another new pilot on the circuit, Cne Jean-Brice Millet. The Aéronautique Navale, which normally contributes several aircraft — especially Rafales — was not present, as the *Charles de Gaulle* had sailed in late April with its full carrier battle group on the 'Akila' deployment to the eastern Mediterranean, and only returned to its home port at Toulon a week after the Meeting ended.

Despite the absentees, any visit to the La Ferté show produces memorable aviation moments, while the sight of various aircraft being slowly brought back to life, like the Salmson Cri-Cri and Rapide, can only lift the spirits. ***David Halford***

Fury and Wildcat offered a contrasting carrier fighter duo.

IWM Duxford VE-Day Flying Day

5
MAY

Providing the first significant event on the UK calendar for 2024, Duxford's VE-Day-themed Flying Day enjoyed good weather for its presentation of largely Duxford-based aircraft. The display started with a novel pairing of the Catalina and The Fighter Collection's Hawker Nimrod, the latter, piloted by Stu Goldspink, giving a spirited aerobatic routine. The initial flying Spitfire of the day was MkXVI RW382 in its USAAF scheme, flown by George Haye. Later came the second, Fighter Aviation Engineering's FRXIVe MV293, again with Stu Goldspink in the cockpit and debuting in its authentic Royal Indian Air Force markings. Fleet Air Arm fighters of different periods, TFC's Wildcat and Fighter Aviation Engineering's Fury, made their initial pass together before solos from Brian Smith and Mark Levy. A formation by two de Havilland Canada types comprised Chipmunk WB585 and DHC-2 Beaver G-DHCZ.

Although not officially part of proceedings, the Fighter Aviation Engineering/Ultimate Warbird Flights two-seat CA-18 Mustang *Jersey Jerk* landed before the flying display and left just after its conclusion. Its welcome appearance from Sywell was on only its second UK flight, by Cameron Rolph-Smith. ***Denis J. Calvert***

Mustang *Jersey Jerk* on show for the first time in public.

Reviews

REVIEWS RATING

★★★★★ Outstanding
★★★★☆ Excellent
★★★☆☆ Good
★★☆☆☆ Flawed
★☆☆☆☆ Mediocre
Enough said

The latest books for the discerning aviation enthusiast

BOOK of the MONTH

Aeronautica Macchi Fighters

by Luigino Caliaro
published by Classic/Crécy

The Macchi fighters of World War Two, like most Italian aircraft of hostilities, tend to be overlooked. Yet to do so is to ignore some capable aeroplanes, which may never have achieved the renown of many of their Axis counterparts and Allied rivals, but demonstrated good performance and favourable flying characteristics. This new title by *Aeroplane* contributor Caliaro covers the three main types: the C200 Saetta, C202 Folgore and C205 Veltro, beginning with a potted history of the Macchi company before launching into detailed accounts of each machine. In each case, their gestation is discussed prior to detailed accounts of operations, largely with Italy's wartime Regia Aeronautica but also the post-war Aeronautica Militare and a small number of users elsewhere. Contemporary combat accounts pepper the main text; more recent interviews with surviving veterans augment them, including one who flew C200s on the Eastern Front, among the lesser-known assignments for these aircraft.

Visually, the book is a joy. The array of photos — black-and-white and colour — is outstanding, and their reproduction excellent. Accompanying them within an attractive layout are all manner of period emblems, artworks, reports, logbook pages, maps and other ephemera. Numerous pages of colour profiles appear close to the back. My sole criticism is a minor one, and not exclusive to this volume, but an irritation nonetheless: the non-use of plurals with reference to aircraft designations, an example being, "significant numbers of C200 served with the units involved". Grammatically, this makes no sense. Otherwise, an absolutely first-class addition to the library, and a welcome antidote to those who argue a serious reference can't also look good. ***Ben Dunnell***

ISBN 978-1-80035-280-3; 12.25 x 9.25in hardback; 288 pages, illustrated; **£40.00**
★★★★★

The Lancaster Story

by Sarah-Louise Miller
published by Michael O'Mara Books

There is no shortage of published works on the Avro Lancaster, that's for sure. Here, Miller approaches the subject from many angles and, in doing so, gives a very fair all-round view of what was surely the RAF's finest heavy bomber of World War Two. This is not a technical treatise on the Lancaster, and the first chapter, 'Inception of a Legend', gives background information — good background information — but little technical detail. It does, though, offer several interesting, not-to-be-found-elsewhere facts, such as the average cost of building a Lancaster, which it puts at £58,974. The following chapters present the duties of the air and groundcrew, Lancaster operations including, perhaps inevitably, the Dams raid, the human aspects of life on an RAF bomber squadron and a very fair summary of the Lancaster's legacy. The text thus succeeds well in putting the Lancaster into perspective, and as such can be recommended to a wide, family readership.

Photos, almost all in monochrome and well reproduced, are suitably representative. I'd only note that the aircraft pictured in the shot captioned "Dutch civilians wave at the Lancasters […] during Operation Manna" look an awful lot like B-17s. ***Denis J. Calvert***

ISBN 978-1-78929-639-6; 9.5 x 6.2in hardback; 256 pages, illustrated; **£16.99**
★★★

Attack and Defence: A History of RAF Langham and its Dome Trainer

by Mick Barham and Mark Glaister
published by Posthouse Publishing

If you don't know the Langham Dome, it's an award-winning museum housed inside the original anti-aircraft gunnery trainer built in 1942 on the RAF Langham site, deep in the charming North Norfolk countryside. This innovative attraction celebrates its 10th anniversary this year, making the appearance of this book on the history of the station as a whole all the more welcome. Foremost among its wartime residents were a variety of Coastal Command units, most famously flying

ATTACK
AND
DEFENCE
A History of RAF Langham and its Dome Trainer
Mick Barham & Mark Glaister

Beaufighters but also Ansons, Wellingtons and others. They and their exploits are featured in recounting the airfield's life, while the workings of the dome, and how it came to be a museum, bring that part of the story to the fore.

The authors are the Langham Dome's archivists, and their text succeeds in being well-written and offering good depth. Since this is a small-volume publication, certain allowances can be made when it comes to production values, though it should be pointed out that quite a few images are pixelated from being blown up too large. Nevertheless, a fine example of local aviation history in print. ***BD***

ISBN 978-1-903872-42-0; 5.75 x 8.25in softback; 120 pages, illustrated; **£9.95**
★★★

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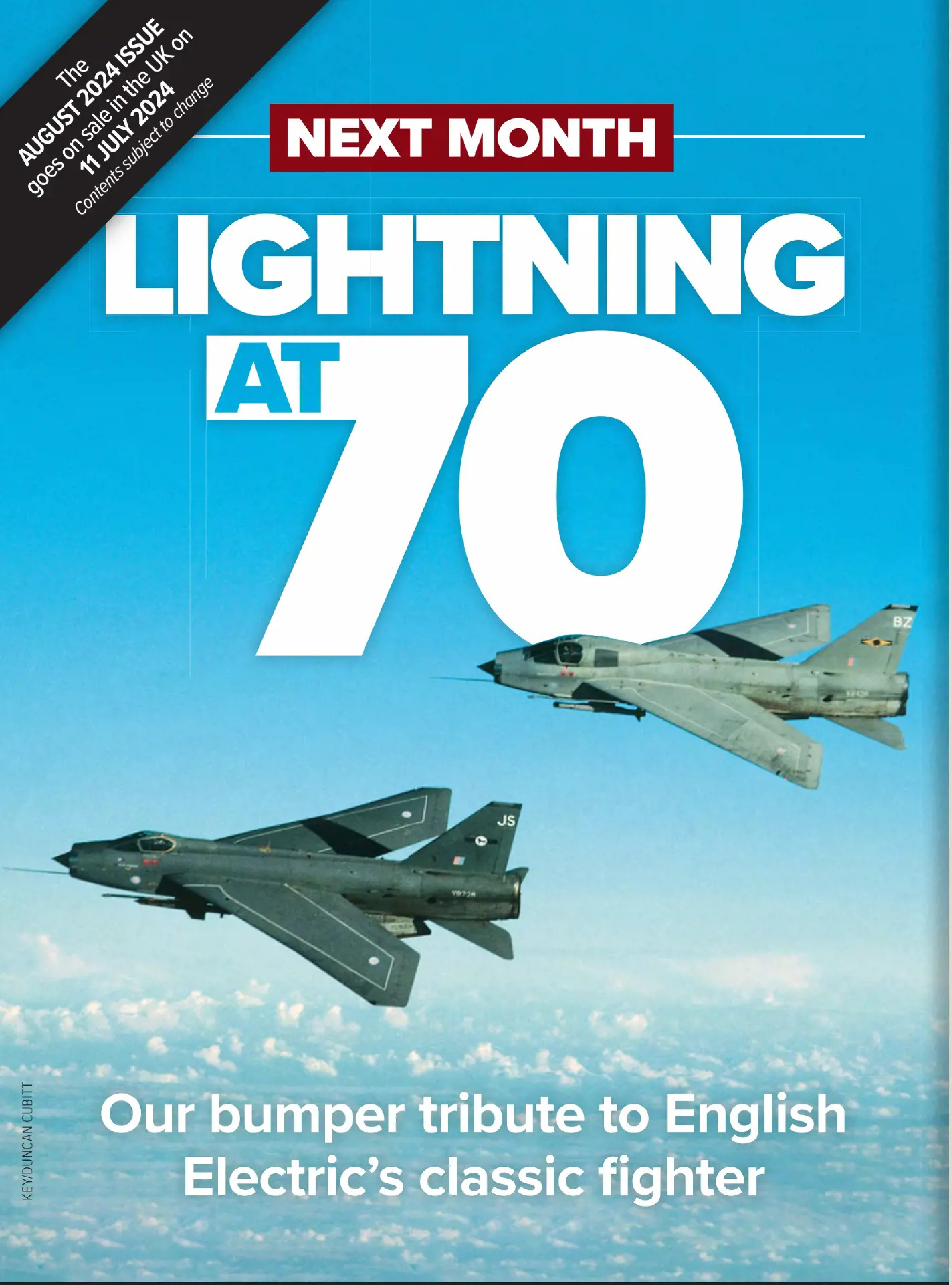

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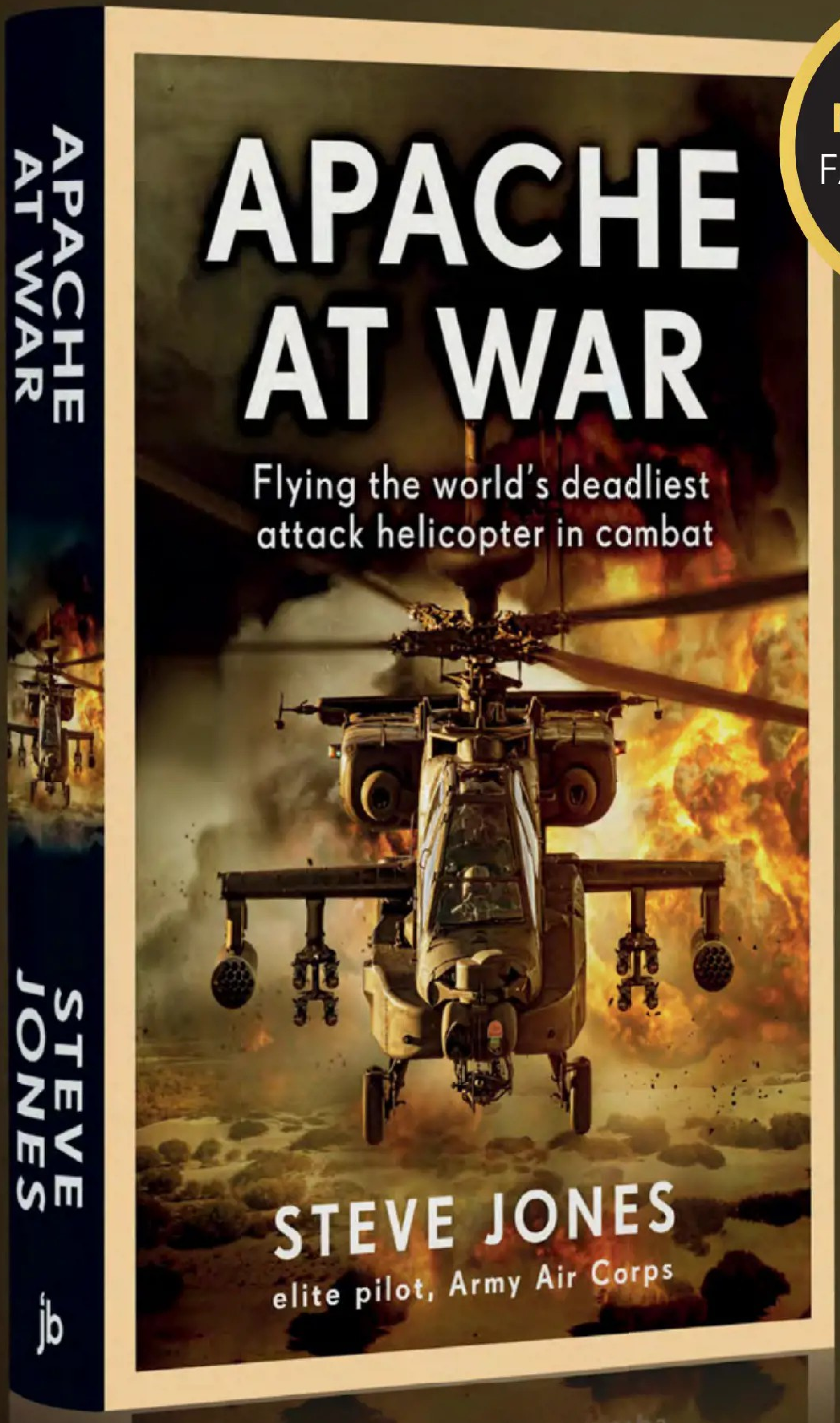
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